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ABSTRACT

This document contains the outcomes of a pilot project to develop materials and methods of integrating occupational health and safety into the curriculum of the technologies at a technical college. Section I is a model of how to integrate health and safety into a vocational-technical curriculum. Based on the Outcomes-Based Guidelines developed by the Kansas State Board of Education, this section outlines a mechanism for curriculum development in the classroom. Four chapters cover the following subjects: the curriculum planning process, outcomes of integrated school health and safety programs, implementation of the health and safety education curriculum plan, and evaluation. Section II describes a pilot project for an automotive technology course. It presents curricula and lesson plans using the methods and materials identified in the model in Section I. They are: a course syllabus (description, specifications, topical outline, objectives, task list, and lesson plan) for shop safety and hand tools; suggested topics for a series of seminars on health and safety; and a welding lesson plan (objectives, task list, topical outline, and test). Section III provides guidance for establishing two laboratory-based activities: developing a health and safety program in the laboratory of the relevant technology and establishing a health and safety committee, both for the school and the laboratory. Section IV discusses how individuals learn and lists materials purchased for the project. Section V lists nine resources for automotive technology and contains an eight-item bibliography, surveys, and the Kansas guidelines. (YLB)

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Workplace Health and Safety Across the Vocational/Technical Curriculum

A project underwritten by George M. Briggs Trust Fund,
Department of Education

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Section I	Methods and guidelines for integrating health and safety into the curriculum.
Section II	A pilot project for the classroom.
Section III	A pilot program for the laboratory.
Section IV	Learning materials.
Section V	Appendices, bibliography and resources.

Introduction

WORKPLACE HEALTH AND SAFETY ACROSS THE VOCATIONAL/TECHNICAL CURRICULUM

This project was underwritten by a grant to the Occupational Health and Safety Department at Central Maine Technical College from the George M. Briggs Trust Fund, which is administered by the Maine Department of Education. The purpose of the grant is to develop a pilot project to develop materials and methods of integrating occupational health and safety into the curriculum of the technologies at a technical college.

The project goals and objectives were discussed at a Department Chairperson's meeting at Central Maine Technical College in December 1991. At this time, the departments of the Technologies were invited to participate in the pilot project. Of those departments who wished to participate, Automotive Technology was most amenable, as they were working on a complete revision of their curriculum, and it was a good opportunity to integrate health and safety into the revisions. For this reason the Automotive Technology Department was selected for the project.

Needs Assessment

Maine has the highest incident rate (frequency) of accidents in the United States, according to statistics from the Maine Bureau of Labor Standards. According to the same source, 33.3% of all accidents occur in the first year of employment; almost one half (48.6%) occur in the first two years of work. The need to train new employees in health and safety is paramount in reducing injuries and illnesses in the workplace. A survey conducted by the Maine Auto Dealers Association as part of this project confirms the need to train workers in occupational health and safety before they reach the workplace. A copy of the survey and a summary of the results appear as Appendix A in Section V.

Good techniques in health and safety (training) provided at the vocational/technical level reinforce health and safety practices in the workplace; conversely, bad habits acquired elsewhere are that much more difficult to overcome in the occupational setting. Therefore, there is a great need to provide health and safety education at the vocational/technical level.

Development of a Model Curriculum

An extensive search for existing methodology was conducted, and very little material was found on integrating health and safety into the context of a technical curriculum. A list of existing resources appears as Section IV to this paper. The National Institute of Occupational Safety and Health (NIOSH) has done some work in business (Project MINERVA), engineering (Project SHAPE), and medicine (Project EPOCH). Projects MINERVA and SHAPE are included in the list of resource materials. NIOSH has also developed a publication for vocational instructors titled "Safety and Health for Industrial/Vocational Education"; this material is provided in section 3. These materials provided little guidance in the method of integrating health and safety into a curriculum of a technology, although they were very helpful in designing the content of a health and safety program in the laboratory.

The information that was most helpful concerning a method to develop an integrated curriculum was provided by the Kansas State Board of Education. This publication is entitled "Kansas Outcomes-Based Health Education Guidelines: A Multi-level Approach for Program and Curriculum Development"; the Kansas Guidelines were the basis for developing the methods section of the project. The Kansas guidelines were developed to integrate health into the curriculum of K-12. This project replicates the Kansas model, and has modified it to incorporate health and safety into a technical college curriculum. This project is deeply indebted to the Kansas State Board of Education for its allowance of the use of their materials. The Guidelines, modified for post-secondary vocational/technical education appears as Appendix C.

An outcomes-based approach was chosen because of its relevancy to competency-based programs offered by Central Maine Technical College, and reinforces the concept of end result skill assessment, which is the method of assessment used by programs at Central Maine Technical College.

This project is comprised of five sections:

SECTION 1) Methods and guidelines for integrating health and safety into the curriculum. This section outlines a mechanism for curriculum development in the classroom. The basis for this section is the Outcomes-Based Guidelines developed by the Kansas State Board of Education, modified for use in post-secondary education. Section 1 describes a model program; not all elements of this model need to be incorporated to have a successfully integrated program of health and safety into a curriculum of a technology.

SECTION 2) A pilot project for the classroom. This section presents curricula and lesson plans using the methods and materials identified in the model in section 1. The pilot project was developed for and implemented by CMTC's Automotive Technology Department. Carl Hinkley of Automotive and Thomas Ryan of Occupational Health and Safety collaborated on the development of this section during the Summer, 1992.

SECTION 3) A pilot program for the laboratory: developing a health and safety program. A laboratory-based health and safety program is provided using the model from the NIOSH publication "Safety and Health for Industrial/Vocational Education". Guidelines from NIOSH are also provided for the formation of a health and safety committee. This pilot program including development, implementation, and review, with assistance from program instructors, will begin in Fall, 1992.

SECTION 4) Learning materials, including but not limited to, videos, publications, handouts, and other materials will be provided as needed to the Automotive Technology Department to enable implementation of the project. Materials purchased are listed in this section.

SECTION 5) Appendices, bibliography and a list of resources which can be used by the Automotive Technology Department for development of further research into health and safety issues.

SECTION I

REPRINTED WITH MODIFICATIONS FROM THE "KANSAS OUTCOMES-BASED HEALTH EDUCATION GUIDELINES: A MULTI-LEVEL APPROACH FOR PROGRAM AND CURRICULUM DEVELOPMENT".(1991)

This section is a model of how to integrate health and safety into a vocational/technical curriculum. An ideal program would include many, if not all, of the elements provided in this model. This model is taken in large part from the "Kansas Outcomes-Based Health Education Guidelines" as modified for the technical college environment. The "Kansas Outcomes-Based Health Education Guidelines" as modified appears in its entirety as Appendix C.

SECTION I
METHODS FOR INTEGRATING HEALTH AND SAFETY INTO THE CURRICULUM

CONTENTS

CHAPTER 1: THE CURRICULUM PLANNING PROCESS

- Elements of Effective Health and Safety Curriculum
- Steps for Writing the Curriculum Plan
- Content of the Curriculum Plan
- Planning for Allocation of Instructional Time

CHAPTER 2: OUTCOMES OF INTEGRATED SCHOOL HEALTH AND SAFETY PROGRAMS

- Program Goals and Outcomes
- Indicators of Student Achievement of Outcomes

CHAPTER 3: IMPLEMENTATION OF THE HEALTH AND SAFETY EDUCATION CURRICULUM PLAN

- Implementing the Curriculum Plan
- Sample Criteria for Selecting Health and Safety Curriculum
- Staff Development
- Sample Needs Assessment for Staff Development
- Lesson Planning
- Sample Lesson Plan

CHAPTER 4: EVALUATION

Selecting Appropriate Measures

Sample Measures
- Process Objectives
- Instructor Perceptions

CHAPTER 1: THE CURRICULUM PLANNING PROCESS ELEMENTS:

Elements of Effective Health and Safety Curriculum

Steps for Writing the Curriculum.

Content of the Curriculum.

Planning for Allocation of Instructional Time.

Elements of Effective Health and Safety Curriculum should include:

1. Curriculum that is behavior-focused.

   In some cases behavior modification concerning health and safety will be required.

2. Curriculum that is skills-based. Students will acquire:

   a) Skills for safety and health.

   b) Skills to identify high risk situations.

   c) Skills to avoid high risk situations.

   d) Skills to take protective actions in high risk situations which can cause acute and chronic illnesses.

   e) Skills to identify and correct situations where acute and chronic illnesses can occur.

3. Continuity: repeated, consistent instruction produces a higher impact.

4. Enough time must be devoted to introducing new health and safety skills.

5. The instruction must be delivered by trained personnel.

   a) Studies by the Kansas Board of Education indicate teachers not specifically trained as health educators provided meaningful instruction with a minimum of nine hours of in-service training.

b) Instructors will need annual update sessions to review curriculum and to improve teaching skills in health and safety.

c) Studies show that educators who participated in training implemented the curriculum to a greater extent than those who did not receive training.

6. School policy supporting health and safety instruction.

   There must be commitment from all levels of the school regarding health and safety.

7. Involvement of students in program decisions and leadership increases effectiveness.

   Such methods as cooperative education, participation in health and safety committees, and campus-wide health and safety programs will enhance the delivery of health and safety instruction.

Steps for Writing the Curriculum

1. Conduct a needs assessment.

   a) Review the needs of the instructors to provide health and safety education.

   b) Conduct a survey of the technology employers to review their needs for health and safety education.

   c) Conduct a health and safety audit of the laboratory of the technology.

   d) Evaluate the accident rate of the trade or technology

2. Review current literature for up-to-date information on effective health and safety programs. This could consist of contacting various education departments for curriculum material, soliciting and reviewing curriculum guidelines from the National Institute for Safety and Health (NIOSH), and review of journals in the field of occupational health and safety.

3. Conduct a study of the amount of health and safety education now being provided; if available review the results of past evaluations.

4. Work with the health and safety committee to write or revise a health and safety program for the laboratory of the technology.

5. Solicit review from the technology's advisory committee, students, and health and safety professionals.

Content of the Curriculum:

A curriculum should include:

1) Philosophy of the health and safety education program

   a) What should the program provide?

   b) How should the program be delivered?

2) Health and safety education program outcomes

   What knowledge, skills, practices, and values should the student acquire as a result of being in the program?

3) Indicators of student achievement of the outcomes.

   What indicators can assist in determining when a student has achieved the knowledge, skills, practices and values?

4) Level outcomes.

   What knowledge, skills, practices, and values should a student exhibit at specific stages of the plan?

5) Integration of outcomes across disciplines.

   Where will the health and safety education for the technology occur? Identifying in each segment of instruction where the education is to occur can prevent duplication of instruction and avoid omitting essential parts of the material.

6) Time allocation for health and safety Instruction.

7) Instructional Materials:

   a) What instructional materials will be used?

   b) Selection of instructional materials should be made <u>following</u> identification of outcomes and allocation of instructional time.

8) Method of Evaluating the Program:

   a) How will the program be evaluated?

   b) What assessment procedures will be used to collect information used for program improvement?

Planning for Allocation of Instructional Time

1) Consideration of the curriculum of the technology is vital in planning integration. However, the goal of the integration should be to implement health and safety in a manner in which the content is synthesized with the curriculum of the technology. The more successful the integration, the less time will be specifically required for safety and health instruction. By planning instruction as described, there needs to be no time or a minimal amount of time specifically allotted to health and safety education in the technology.

2) In the laboratory, certain time should be given to the development of a health and safety program. Time spent will be dependent on the needs of the technology and the stage of development regarding health and safety. An example is provided in Section 3: Developing a Health and Safety Program in the Laboratory of the Technology.

Chapter 2

OUTCOMES OF SCHOOL HEALTH AND SAFETY EDUCATION

Program Goals and Outcomes

Indicators of Student Achievement of Program Outcomes.

As a result of participating in an integrated curriculum, a learner:

1. Acquires a basic understanding of health and safety procedures.
2. Knows healthful and safe behaviors which can prevent the majority of occupational death, illnesses, injuries and loss of quality of life.
3. Identifies potential hazards in the workplace.
4. Demonstrates basic first aid procedures.
5. Identifies and selects appropriate health and safety resources.
6. Demonstrates responsibility in making healthy and safe choices in the workplace.
7. Copes with stress in the workplace.
8. Learns how to acquire new skills.
9. Accepts responsibility for personal health and safety.
10. Respects others in the workplace.
11. Engages in healthy and safe work practices.
12. Abstains from behavior which could lead to possible injuries and illnesses in the workplace.

Indicators of Student Achievement of Health and Safety Education

A) As a result of participating in an integrated course of study in a technology, a student will:

1) Name risk behaviors which cause the majority of preventable deaths, diseases, injuries, and loss of quality of life.

2) List health and safety practices which can prevent the majority of deaths, injuries, and loss of quality of life that result from exposures in the workplace.

3) Summarize behaviors which can prevent and control occupational illnesses.

4) Identify behaviors for maintenance of positive mental and emotional health; for example, reducing stress.

5) Name environmental and occupational health hazards.

6) Distinguish between chronic pain and injury.

7) State the role of stress fatigue in causing health problems.

8) Identify the issues of chemical dependency and its negative effects on healthy and safe work performance.

9) Demonstrate personal hygiene practices.

10) Demonstrate basic first aid and CPR procedures.

11) State procedures for all emergencies, including but not limited to fires, bomb threats and natural disasters. Know how to contact emergency medical personnel.

12) Describe basic preventative health care procedures, and demonstrate healthy and safe decision-making.

13) Identify various providers, public and private, of health and safety education.

14) Demonstrate healthy and safe decision-making.

15) Perform self-appraisal of own status and exhibit self discipline in working in a healthy and safe manner.

16) Engage in work practices which protect the health of the community and the environment.

17) Use electronic and media sources to seek new information.

18) Critique information and use problem solving in learning new skills in working in a healthy and safe manner.

19) Demonstrate knowledge of personal learning style regarding health and safety.

B. Works and interacts in a healthy and safe manner with others. As a result of participating in a Technology which integrates health and safety, the student will:

1) Seek help when needed.

2) Be courteous to others.

3) Accept human diversity.

4) Consider the effects of own actions on others.

5) Accept the decision of others not to engage in behaviors that could endanger themselves or others.

6) Participate in activities which show concern for the community, the environment, and society.

7) Evaluate and communicate personal strengths and weaknesses concerning occupational and health and safety.

Chapter 3

IMPLEMENTATION OF THE HEALTH AND SAFETY EDUCATION CURRICULUM PLAN

Implementing the Curriculum Plan

Sample Criteria for Selecting Health and Safety Education

Staff Development.

Sample Needs Assessment Form for Staff Development.

Lesson Planning

Sample Lesson Plan.

Implementing the Curriculum Plan

To effectively implement the curriculum plan, the following elements must be included:

Quality Instructional Materials: Every effort will be made to have quality instructional materials available for the needs of the various technologies. As a pilot program, the Automotive Technology Department will work with the Occupational Health and Safety Department to appropriate quality instructional materials.

Staff Development: Instructors responsible for delivering instruction need ongoing assistance in acquiring additional knowledge, skills, and resources for providing health and safety education related to their technologies. Staff development is particularly important for instructors not specifically trained in the health areas. An example for assessing the needs of staff is provided.

Meaningful and Relevant Lessons: The implementation process also requires instructors to develop lessons which will enable the learner to achieve outcomes identified in the curriculum plan. Strategies are identified and sample lesson plan guidelines are included in this chapter. Additionally, it is suggested that integration of health and safety in the technological curriculum be reinforced by direct instruction.

Staff Development

"Staff development is engaging instructors and other staff in a process which provides a wide variety of opportunities for growth in knowledge within the education profession". (Cohen, 1991, Kansas State Guidelines, 1991)

Characteristics of successful staff development programs include: (Regional Laboratory, 1987, Kansas State Guidelines 1991)

1. Collectivity and collaboration.
2. Experimentation and risk taking.
3. Incorporation of available knowledge bases.
4. Appropriate participant involvement in goal setting, implementation, evaluation, and decision making.
5. Time to work on staff development and assimilate new learning.
6. Leadership and sustained administrative support .
7. Appropriate incentives and rewards.
8. Designs built on principles of adult learning and the change process.
9. Integration of individual goals with the goals of the college.

A development program which exhibits the aforementioned characteristics may more easily address the needs of instructors and staff to effectively implement the health and safety curriculum plan. For example, providing on-going opportunities for instructors to meet, plan, and experiment with integrated health and safety instruction allows the program to remain current and relevant for the learner. Additionally, effective staff development programs which use available knowledge bases may more readily involve other health and safety professionals as resources for assisting instructors in health and safety knowledge and skills.

Lesson Planning

An outline for structuring a lesson plan follows. This outline incorporates education in the technology with health and safety integrated in the lesson plan.

1. What is to be learned?

    a) Identify the course outcome and unit outcome which the lesson will address.

    b) Identify the potential health and safety problems.

    c) Identify the intended outcome of the lesson. What will the student know, what skills will be developed, and what behavior will result from the lesson?

    d) Identify the health and safety behaviors to be developed.

    e) Identify prerequisite knowledge and skills necessary.

    f) Review of previous learning may be necessary prior to the new learning.

    g) Identify knowledge of health and safety that might need to be reviewed.

2. What will the student do to accomplish the desired outcome?

    a) Identify the activities in which students will participate to review previous learning and achieve the new learning.

    b) Identify how student achievement will be measured in relationship to health and safety.

    c) Identify how students achievement of the intended outcome will be determined. How will students demonstrate that new learning has been internalized?

    d) Identify activities in which students will participate to master learning or to enrich the learning experience.

    e) Identify healthy and safe methods to perform these activities.

3. What will the instructor do to facilitate the learning?

    a) Identify the strategies for facilitating the learning activity. How will the instructor facilitate the internalization of the learning experience?

    b) Identify the process for assessing student achievement of learning. What form(s) of assessment will be used?

c) Identify how the instructor will assess that health and safety is being implemented in the learning process. How will the assessment be performed?

d) Identify how the facilitation process will be assessed. How will the instructor assess his/her own performance?

e) Identify the measurement to be used to determine if the instructor has provided the necessary health and safety instruction for the lesson.

Sample Lesson Plan

Sample lesson plans have been developed by the Automotive Technology at CMTC, and appears in Section 2 of this project.

Chapter 4

EVALUATION

Selecting Appropriate Measures

Sample Measures
- **Process objectives**
- **Instructor Perceptions**

Selecting Appropriate Measures

Evaluating school health and safety programs may best be accomplished by using criterion-referenced measures. Criterion-referenced assessment offers absolute measurement of what the examination can or cannot do. Thus, criterion-referenced measures provide the best information for making decisions about the quality of a program.

Measuring process objectives for program development and implementation may be accomplished through the use of a checklist assessment form. An example is provided on pages 21 and 22.

It may also be important to assess the instructor's perceived self-knowledge, skills, and attitudes about teaching health and safety education as a process measure for program improvement. Examples are provided.

Assessment instruments selected for collecting information to measure outcome objectives must be reliable (consistent in what it measures), valid (yields scores from which valid inferences can be drawn), and free from biases.

When to Administer Measures

Deciding when to administer measures depends on the data-gathering design selected. There are four possible times in which information may be selected from students regarding health and safety education:

(1) Pretest	(2) En route Test	(3) Immediate Post tests	(4) Delayed Post tests

Pretests may be used to identify students' needs so that instruction may be designed accordingly. When compared with post measures, pretest data can be used to measure outcomes objectives. For health and safety, a hazard evaluation of the potential health and safety problems would be a tool for pretesting.

En route tests can provide measures of en route objectives. The information obtained from en route measures can be used to make immediate program improvements. For health and safety integration, in process safety evaluation would be an en route test. Immediate post tests provide measures of outcomes objectives.

Delayed post tests administered several months after a program conclusion provides important information about the long-term effects of students health and safety knowledge, attitudes, and behavior.

Care should be taken not to administer an excessive number of different measures. Determining when to administer should also take into consideration factors such as efficient use of resources (financial and human) to collect, analyze, and make program decisions about the data collected. The curriculums of the technologies are highly intensive, and health and safety education should not become burdensome on the curriculum because of excessive examination.

Instructor Perceptions

Sample questions are provided to measure the instructor's perceptions about personal knowledge, attitudes, skills, and comfort in teaching health and safety education.

Information obtained from questions such as those below can be helpful in measuring the perceptions of instructors assigned to integrate health and safety across the curriculum. When collecting the information, confidentiality and anonymity should be maintained. The results could be appropriately used to design staff development opportunities. This survey appears in Appendix B.

Section 1 contains the elements of a model program of integrated health and safety instruction. Many of the elements can be easily incorporated into a program of study; others will be more difficult. A successful program will not be one that incorporates every element of the model, but one that effectively promotes a healthy and safe lifestyle, both in the workplace and outside it.

Section 2 will incorporate the elements of the guidelines into a workable model for the Automotive Technology.

SECTION II

SECTION 2 - DEVELOPING A PILOT PROJECT FOR THE CLASSROOM

This section was developed by Carl Hinkley of the Automotive Department of Central Maine Technical College. Mr. Hinkley revised lesson plans, tests, and syllabi using the model curriculum of Section 1. Submitted are the new material and where applicable, the original documents are presented. Mr. Hinkley also used the surveys provided in the model curriculum, which appear in the back of this section.

CURRICULUM AND LESSON PLAN
AUTOMOTIVE TECHNOLOGY
REVISED AUGUST, 1992
CARL HINKLEY, INSTRUCTOR

AUTOMOTIVE TECHNOLOGY DEPARTMENT
CENTRAL MAINE TECHNICAL COLLEGE
1250 TURNER STREET AUBURN MAINE 04210

The Automotive Technology faculty will introduce to you a health and safety program. This program will be different than most you've had in the past. It contains health issues along with safety. The program will be taught in every area of automotives. These health and safety issues will be integrated into shop time as well as classroom time until you graduate. Hopefully our goal is to have you continue to practice a healthy and safe lifestyle.

This program has four parts. The first part is a unit on health and safety as it relates to you and the automotive industry. The second part will consist of a series of health and safety seminars along with instruction related to the unit you are in. The third will be shop management and forming of an active safety committee. The committee will conduct risk assessment, update materials, and recommend changes in policies. The fourth part is an exam during Diagnostic Lab on all health and safety areas we covered.

The Occupational Health and Safety Department will assist the automotive faculty in the second phase of this program. They will help us in delivery of seminars on different subjects related to health and safety. These speakers will give you a different look at health and safety from outside the automotive industry.

Student participation will make this program successful. The student will set up the policies through committees. They will develop checklists, record keeping and coordinate seminars with the faculty.

Automotive Technology
100 Safety, Health and Hand Tools

May 26, 1992 Instructor: Carl Hinkley

Course Syllabus

Course Description

This is the first unit of instruction for all students. The coarse deals with health, safety, and tools related to the automotive technology. Safety and health in the work place and personal lifestyle will be discussed. Personal protection, Fire protection, Forming Safety committees and performing safety audits will be covered. Handtool and power tool usage will also be covered.

Course Specifications

Credit hours assigned to the course.....(1)
1. Projected lab/shop hours.....(16)
2. Estimated hours required for outside work (reading, research, etc.).....(15)
3. Total hours scheduled for class meetings.....(14)

Total estimated hours of student effort (total of lines 1,2,3).....(45)

Revised Topical Outline of Instruction

I. Personal Health Safety Habits
   A. Sound personal habits
      1. no joking or horse play
      2. proper clothing including hair out of way.
      3. personal protective equipment.
         a. eye protection
         b. hearing protection
         c. respiratory protection
         d. head protection
         e. hand / foot protection
      4. keeping work area clean.
      5. reporting all injuries.
      6. keeping yourself clean.
   B. Related to your health.
      1. drugs legal and illegal
      2. alcohol
      3. smoking / environment work and play
   C. Using handtools safely
      1. right tool for the job
      2. tools maintained in proper condition
      3. use tools safely
      4. proper tool storage and carrying
      5. proper instruction of powertool uses
      6. safety guards
      7. tool identification and orientation

II. Lockout / Tagout System
    A. Prevents Accidents
        1. notify people concerned
        2. unhook or disable affected machine or vehicle
        3. tag and lock vehicle or machine secure till repair is made

III. Housekeeping
    A. Work area
    B. Flammable materials
    C. Rags / Waste

IV. Fire Safety
    A. Components of fire
    B. Extinguisher types
    C. Locations of extinguishers
    D. Firefighting instruction and when not to fight
    E. Fire Alarms / Exits and escape procedures
    F. Flammable and combustible liquids
        1. types and storage
        2. vapors
        3. gasoline and gas buggy
    G. Fire prevention
        1. work
        2. home

V. Solvents / Hazards
    A. Vapors
    B. Handling / storage
    C. Protection from fire; personal health

VI. Material Data Safety Sheets
    A. Purpose and information they contain
    B. How to use
    C. Location

VII. Electrical Safety
    A. Identify hazards
        1. shock
        2. fire
        3. portable handtool
        4. drop lights
    B. Preventive measures

VIII. Lifting, Carrying, Slips and Climbing
    A. How to lift
        1. personal lifting
        2. heavy objects
            a. engine lift
            b. fork-lift
        3. cars and trucks (jacks and stands)
        4. proper use of lifts and ramps
    B. Hazard when lifting

C. Slips and falls
D. Ladders and climbing

IX. Hazardous Materials
A. Identification
1. Dust
2. Gases
3. Liquids
4. Metals
B. Handling
C. Proper disposal

Course Requirements

Class Test

Student Evaluation and Grading

70% Shop 30% Class

Texts, Tools, and/or Supplies

Safety Practices Guide (Elwood A. Padham)
Lifting it Right (Lift Institute)

OBJECTIVES & TASKLIST

Safety / Health and Tools
Prepared by: Carl Hinkley
Date: May 26, 1992

Objectives: The student will be able to:
{ The student will demonstrate knowledge by written exam and shop experiments. }

1. Demonstrate personal habits that promote safety and health in the work place. This includes proper clothing, eye protection, hearing protection, and respiratory protection.
2. Demonstrate knowledge of proper behavior on job and an environment that promotes a healthy lifestyle.
3. Keep themselves and work area clean.
4. Recognize the effects of drugs, alcohol and smoking on themselves and the work environment.
5. Demonstrate proper use of handtools safety.
6. Recognize need for fire, hazardous materials, and electrical safety. (audits and awareness)
7. Demonstrate use of fire extinguishers, material data safety sheets, and lock out / tag out systems.
8. Recognize proper ergonomics. (lifting and proper tool for proper job.)
9. Locate all fire extinguishers, fire blankets, first aid kits, fire alarms, panic buttons and exhaust fans.
10. Identify tools in assigned box and demonstrate proper toolroom procedures.

Tasklist

1. Wear proper shop clothing as outlined by instructor.
   a. safety glasses ___
   b. proper shoes ___
   c. shirt and pants ___

2. After proper instruction demonstrate to instructor proper power tool safety using drill, bench grinder
   a. Sharpen screwdriver (with grinder) ___
   b. Sharpen cold chisel (with grinder) ___
   c. Sharpen a drill bit (test with drill press) ___
   d. Keeping tools clean and stored safely ___

3. Pass an exam on general safety, fire prevention / control, electrical safety, and health . ___

4. Demonstrate ability to use the following safely:
   a. jacks and stands
   b. lifts ___
   c. parts cleaners ___
   d. gas buggy ___

5. Complete shop diagram containing fire extinguishers, panic buttons, exits, fire blankets, gas storage, first aid kits, exhaust fans and engine exhaust fans. ___

6. Locate material data safety sheet for "Safety Kleen". Record information on health threat and action to take from exposure. (record on a repair order) ___

7. Complete a report on a health concern of your choice related to automotive field.(check with instructor) ___

8. Conduct your own safety audit of the shops and classrooms. ___

Remember! Safety and Health Habits will be part of your grade for every unit you will take. Employers want neat, punctual, and good working habits.

This certifies that I understand and will comply to all safety and health rules, and shop procedures.

Date: Signature:

Instructor:

Original Lesson Plan

Shop Safety and Hand Tools
Instructor: Carl Hinkley
Developed: August 1990

I. General Shop Safety Practices.

A. Personal habits for shop safety

1. no horseplay

2. no running

3. proper clothing

a. no loose fitting clothing
b. no torn or ripped clothing
c. leather shoes no sneakers

4. keep work area clean and picked up

5. keep your clothes and hands as clean as possible

6. report injuries

7. professionalism

8. health related issues that effect your work

a. drugs illegal and legal

1. loss of work
2. affects your work performance
3. not as safe as you can be
4. endanger others
5. effects on your body
6. reaction time / drowsiness

9. alcohol

a. driving under the influence

1. record may lose your job
2. hurt or kill someone

b. impairs your ability to think clearly

1. endangers co-workers
2. poor workmanship

c. loss of work or productivity

d. effects on your body

10. smoking

    a. effects on you
    b. effects on others
    c. customers don't want you smoking in their vehicles
    d. fire hazard near flammables
    e. lighters in pockets hazardous when welding
    f. smoking is prohibited where asbestos is present (brakes, clutches)

B. Safety rules for hand tools

    1. use proper tool for job

    2. keep tools in proper condition

    3. keep tools clean and properly stored

    4. don't leave creepers or tools lying in way

C. Safety around power tools and machinery

    1. never run any power equipment without proper instruction

    2. check machine for any safety hazards

    3. always stop machine when making adjustments by hand

    4. wear proper eye protection (safety glasses and shield)

D. Eye protection

    1. Hazards

        a. metal
        b. solvents / gases
        c. rust / dirt

    2. Safety glasses will always be worn in shop

        a. explain types

    3. goggles and/or shield will be worn when grinding, and other higher risk areas

    4. show film or other type of demonstration

1. define hazards

    a. impact / air tools

    b. hammering, machinery

2. wear hearing protection when running machinery and/or work around loud noises

    a. ear plugs

    b. full ear muffs

F. Lung protection

1. Hazards

    a. lung damage caused from vapors

    b. dust

    c. carbon monoxide

    d. other gasses

2. read labels on chemicals or solvents you are using

3. don't use in confined space

4. never run car in shop without proper ventila tion

5. when welding or cutting watch fumes

6. extreme dust, brake dust, body work

G. Driving habits

1. speed in shop and school grounds

2. seat belts are to be worn when ever driving, even in shop

3. always test brake before moving a vehicle

    a. car may need parts and is disabled

4. look around vehicle before moving or backing

    a. other vehicles

    b. tools

5. Lock/Out - Tag/Out if car is to be disabled

H. Lockout / tagout system

1. Prevents accidents

a. notify people concerned

b. unhook or disable effected machine or vehicle

c. tag and lock vehicle or machine secure till repair is made

d. service manager or parts manager usually controls

G. Housekeeping

1. On page twenty-nine about house-cleaning

2. traffic areas clean

3. proper waste storage (rags, flammable materi als)

4. clean up spills quickly

5. clean floors and work areas regularly

6. tools, tool boxes, will be stored in proper places

7. conference room, service manuals, and test equipment will also be kept clean each day

H. Lifting, carrying, slips and climbing

1. How to lift

a. personal lifting

b. heavy objects

1. engine lift

2. fork-lift

c. cars and trucks (jacks and stands)

d. proper use of lifts and ramps

2. Hazard when lifting

3. Slips and falls

4. Ladders and climbing

1. Identification

   a. dust
   b. gases
   c. liquids
   d. metals

2. M.S.D.S. (used EPA sheet for example)

   a. materials name
   b. CASE number
   c. DOT number
   d. data
   e. hazard summary
   f. identification
   g. reason it is on list
   h. how to determine exposure
   i. how to reduce exposure or action to take
   j. health hazards
   k. personal protective equipment
   l. fire hazards
   m. handling and storage
   n. first aid
   o. ecological / environmental information

3. D.O.T. Emergency Response Guidebook United Nations Classification System

   a. ID number of material can be used take action guide
   b. name can be used to take action guide
   c. guide number to ID action to take, hazards, handling
   d. chemtrec description 1-800-424-9300

4. Proper handling of auto shop materials

   a. waste oil
   b. anti-freeze
   c. gasoline
   d. brake dust
   e. freon
   f. cleaners and solvents

II. FIRE SAFETY

A. What is fire?

1. heat

2. oxygen

3. fuel

4. chain reaction

B. To Extinguish Fire

1. Remove any one element

2. Remember prevention is the best way to stop fires.

OH 1&2

C. Portable Fire Extinguishers

1. Types of extinguishers (Rating System)

a. Class A contain water. (wood, paper, cloth fires) Will freeze

b. Class B contain CO2 or dry chemical (flammable liquids, or combustible liquids) Won't Freeze

c. Class C contain a dry nonconductive chemical used for (live electrical fires) B & C contain sodium bicarbonate, potassium bicarbonate, ammonium phosphate. Can't use on paper etc. (ordinary base dry chemical)
Won't freeze

d. A B C Dry chemical extinguishers (multi - purpose base) contain different chemicals
Won't Freeze

e. Class D (combustible metals) we don't use this type.

f. Halon

2. Location of extinguishers

1. keep fully charged (pressure gauge on some)

2. to be kept in proper designated area

3. easy to get to

4. easy to see (walls should be marked with sign)

3. Instruction for use of extinguishers

1. Pull pin

2. Point nozzle

3. Press handle

4. Sweep back and forth

4. To Fight or Not to Fight (get out)

5. Call Fire Dept. (Direction will be posted by phones) hand out procedure to all students

6. Pull fire alarm if needed.

III. Fire Blankets

A. Used if clothes on fire

B. Stop, Drop, Roll if your clothes are on fire

C. Wrap fire blanket around person to help put out the fire. Demonstrate operation of extinguishers and have students identify.

PHASE TWO SEMINARS AND IMPLEMENTATION OF SAFETY AND HEALTH
AUGUST, 1992

This is a series of seminars on health and safety. These will be given once a month. They will be coordinated between Automotive Technology, the Occupational Health and Safety Technology departments along with a student safety committee. As the seminars progress committees will conduct safety audits, develop record keeping procedures, update safety material, and develop policies for shop.

These seminars are to be coordinated into our Friday meetings with all students and no longer than 45 minutes. Then each student will participate in some aspect in the health and safety program. Given below are examples for seminars and how the student will gain competent skills. These skills will be useful when the student reaches employment.

Suggested
TOPICS FOR SEMINARS:

1. Safety Audits and Risk assessment
   A. Who and When do we conduct them
   B. What do we look for and document any problems.

2. Organization of safety and health programs.
   A. Purpose and structure
   B. How to organize

3. Committee values and roles
   A. Duties of committees
   B. Procedures for recommendations

4. Safety and Health related to automotive
   A. Asbestos
   B. Solvents health effects and handling
   C. Freon, anti-freeze and fluid handling

5. Respiratory Health
   A. Maine Lung Association

6. Alcohol and drug abuse

7. Ergonomics in the work place

8. Lifting it right

9. Developing a personal health plan

10. Discussion on lost productivity due to illness and injury

11. Hazardous materials
    A. Data safety sheets
       1.use of and updating

12. Smoking and how it effects you and others

13. Development of emergency plans

14. Defensive driving techniques

Integrating this program into the automotive curriculum is done by:

1. Having the each student participate daily by enforcing safe and healthy working practices.

2. Each day a student will be assigned as the toolroom manager. One of their many jobs is to conduct a safety audit of tools and shop. (checklist)

3. A weekly shop inspection will be conducted by shop foreman.

4. Shop will be inspected monthly by safety committee.

5. Checklist to be developed by committee and approved by instructors.

6. Health and safety question will be written into unit tests or quizzes.

7. Final test on Safety and Health to be given during the last unit of instruction.

Revised Welding Lesson Plan
Welding 1
Instructor: Carl Hinkley

Objectives: The student will:

1. develop safe welding practices and recognize health risks.
2. become familiar with different types of welding equipment.
3. use acetylene equipment to cut and braze.
4. use shielded metal arc welding equipment.
5. use different types of electrodes for different metals and application.
6. use a MIG welder.

Student responsibility: Complete Task list and pass final test.

Task List:

1. Complete a safety check on personal protection equipment.
2. Complete a safety check on acetylene welding equipment.
3. Demonstrate proper lighting procedures and regulator settings to instructor.
4. Demonstrate proper cutting and brazing techniques.
5. Complete a safety check on SAW equipment.
6. Demonstrate ability to strike an arc an maintain a constant bead of weld.
7. Demonstrate ability to weld a lap joint and butt joint.
8. Complete a project of instructors choice.
9. Complete a safety check on MIG welding equipment.
10. Demonstrate ability to maintain a bead using MIG equipment.

Lesson 1

I. Types of Welding (GAS)

A. Oxyacetylene

1. Mixing of oxygen and acetylene

a. flame is high temperature (5900 degrees F)

b. flame temperature is hot enough to melt through most metals

c. by adding more oxygen to mixture you can cut most metals

2. Oxygen

a. need oxygen to have any combustion

b. remove all other gases in air we breath combustion increases

c. most efficient welding and cutting processes use 99.5 % purity

3. Acetylene

a. easy combustible burns with high heat

4. Oxyacetylene Cylinders

a. oxygen standard size hold 244 cubic feet O2

1. under 2400 pounds of pressure

b. acetylene uses a porous material in cylinder at a much lower pressure about 400 psi

5. Other types of gas can be used

a. Mapp gas (acetylene and propane)

1. tanks lighter but need a little more gas delivery

b. Propane (cooler flame)

II. Welding Equipment (GAS)

A. Personal Safety Equipment

1. Gloves

a. leather

b. long cuff

c. insulated

2. Proper foot wear

a. high cut boots or shoes

b. pant legs over boots not tucked in boots (prevents slag from catching in boot)

3. Proper clothes

a. long sleeve shirt (sleeves rolled down)

b. pants no holes or frays

4. Eye protection

a. Goggles or face shield

b. Shade lens (shade # 5 or 6)

c. cover lens clear (does reflect some light and protects filter lens from spatter.)

5. Other personal protection

a. Do Not Carry Butane Lighters on You

b. Remove matches from your pockets

c. Make Sure No Grease or Flammable Liquids on cloth-ing

6. Health risks of gases

a. Acetylene	Anesthesia (high concentrations)
b. Carbon monoxide	Headache, nausea, dizziness, collapse then death effects cardiovascular system in long term
c. oxides of nitrogen	Chronic bronchitis, emphysema

d. ozone — respiratory tract irritation, pulmonary insufficiency

e. phosgene — emphysema

7. Metals

a. arsenic — nausea, vomiting, diarrhea (lung cancer and other ailments)

b. cadmium — chest tightness, cough (prostate and lung cancer)

c. zinc — metal fume fever

d. tungsten — cough, asthma, fibrosis

8. Have students find MSDS on the rod or materials they are welding.

B. Oxyacetylene Equipment

1. Pressure regulators

a. contain two gauges

1. cylinder pressure

a. oxygen reads as high as 4000 psi

b. acetylene reads as high as 400 psi

2. working pressure

a. oxygen reads up to 60 psi

b. acetylene reads up to 30 psi

2. Regulators have a diaphragm to regulate pressure

a. adjustable to desired pressure

b. single or dual diaphragm regulators

c. some acetylene regulators use lefthand threads so they can't be mixed up with O2 regulator

3. Hoses

a. two hoses red for acetylene green for oxygen

b. have check valves to guard against flashback

4. Torch and tips

a. torch has control valves for O2 and acetylene

b. selection of tips for welding and brazing

1. smaller tips for light metals

2. larger tips for thicker metals

3. cutting tips

a. acetylene tip five holds

b. mapp tip seven

C. Safety Check of Equipment

1. After regulator installation check for leak tanks to regulator.

2. Check hoses and fittings for leaks.

3. Check that shut-off valves and touch seats don't leak.

4. Make sure tanks are secured to cart or wall.

D. Lighting

1. Turn tanks on

a. oxygen all the way

b. acetylene about 3/4 of a turn

1. safety to shut off quickly

2. Purge oxygen and acetylene from lines

a. purges any dirt that may be in lines

3. Set regulators

a. welding or brazing 00 to 2 tip size

1. oxygen to 1 to 2 pounds

2. acetylene to 1 to 2 pounds

3. larger tips set higher

b. cutting

1. tip size 0 O2 15 to 20 psi
acetylene to 3 to 5 psi

2. tip size 1 O2 35 to 50 psi
   acetylene to 5 to 7 psi

3. tip size 3 O2 50 to 60 psi
   acetylene 7 to 9 psi

4. tip size 0 cutting 1/8 " to 1/4 "

   tip size 1 cutting 1/4 " to 1 "

   tip size 3 cutting 1 " to 3 "

4. Open acetylene valve and light torch using spark lighter. (never use a cigarette lighter)

   a. adjust flame to within 1/8 " of tip

5. Open oxygen valve and adjust to a neutral flame.

E. Types of Flames

1. Acetylene Flame 1500 degrees F. not suitable for welding.

2. Strong Carbonizing 5,700 degrees F. Metal boils

3. Slight Carbonizing 5,800 degrees F. little or no puddling

4. Neutral Flame 5,900 degrees F. metal clean and clear flowing easily

5. Oxidizing Flame 6,300 degrees F. excessive foaming and sparking of metal.

F. Safety in Welding Area

1. Take notice of any combustibles in area or near weld area.

2. Never weld near paint spray or gasoline containers.

3. Notice material to be welded any coatings etc.

   a. these could give off hazardous vapors

      1. galvanized metals etc.

4. Move work area to be welded so slag doesn't fall on you.

   a. or take some other precaution

5. Watch that slag or falling pieces never come in contact with torch hoses.

G. Preparation of surface to weld

1. Clean edges to weld and make sure they are free of dirt and grease.

2. Grind a vee or angle on both pieces if possible.

3. Use holding device to hold pieces into place.

4. Use a soap stone to mark metal to be cut.

H. Choice of Welding Rod

1. Steel rod

a. most metals needs flux to help process

b. molten metal and rod combine flux allows impurities to rise to the top.

2. Braze Welding (Bronze)

a. uses brass rod usually coated with flux

b. fluxes vary to application clean metal rusting metal

c. braze welding rod material doesn't mix with base metal just bonds pieces together

d. brazing like soldering uses lower heat bonds by capillary action.

e. brazing and bronze welding used on all metals and works well on cast iron

I. Welding Methods

1. Tack welding

a. long pieces joined together you can tack small beads of weld every so many inches or feet to hold metal in place so it could be welded later.

2. Forehand Welding

a. rod is placed in front of torch in direction of weld

b. also called puddle welding

3. Backhand Welding

a. torch moves ahead of rod in direction of weld

b. this method is usually easier to perform than forehand method

4. Cutting

a. heat iron or steel to 1600 degrees it burns.

b. the contact with outside air isn't enough to burn it complete

c. once burn starts introduce oxygen

d. preheat metal to red almost white heat

e. tip about 1/8 " from surface

f. raise torch to about 1/2 " and slowly turn on oxygen and watch for cut through

g. lower tip to about 1/8 " and maintain 90 degree angle to surface.

h. Move fast enough to maintain cut through metal

i. use one hand to operate torch and the other to guide it.

This completes gas welding and cutting

Lesson II

I. Shielded Metal Arc Welding

A. A process that uses an electric arc to generate heat to weld.

1. Uses a covered metal rod

2. Arc created between rod and base metal

B. SMAW is the most popular, versatile, arc welding process.

1. Process can be used on ferrous and non-ferrous metal

2. Able to weld over 18 gauge metal in all positions

3. Arc is under the control of the welder at all times

a. controls speed

b. it is visible to the welder

4. Equipment is rugged and simple

5. Relatively inexpensive

C. Invented in partly by Sir Humphrey David of England 1801

1. Wasn't taken serious until 1881

2. First used WW 1

3. Shipbuilding

II. Method of Application

A. Manually operated process

B. Welder controls the direction and speed

III. Principles of Operation

A. A constant current power source is preferred for manual welding.

B. The welder can change voltage and current flow by changing length of arc.

1. longer arc higher voltage less amps

2. shorter arc lower voltage higher amps

C. Metal Transfer take place

1. When arc is struck intense heat created.

a. rod tip melts and surface of base metal melts

b. temperatures reach about 9000 degrees F.

c. rod and base metal combine

IV. SMAW Equipment

A. Power Sources

1. Provide proper voltage and current to weld

2. Most operate on 230 volts or 460 volts

B. Welding can use either AC or DC current

1. DC welding has advantages

a. is better at low current and small rod

b. all classes of coated rod can be used with good results

c. arc starting is usually easier

d. maintaining an arc is easier

e. better to use in out of position welding

f. better on sheet metal

g. produces less weld spatter

2. AC welding combination of both polarities

a. Polarities change 120 times per second or 60 Hertz

b. Advantages of AC

1. arc blow is rarely a problem

2. AC welding well suited for welding thick metal and using large rod

V. Hardware Needed to Arc Weld

A. Base metal

B. Electrode

C. Electrode holder

D. Electrode lead

E. Power source

F. Work lead

G. Work grounding clamp

H. Personal protective equipment

VI. Electrodes

A. Provides filler metal and shielding for arc

B. Covering is a flux and does the following

1. Form a slag blanket over weld

2. Provides a shielding gas to prevent contamination

3. Provides ionizing for smoother arc operation

4. Provides deoxidizers and scavengers to refine the weld

5. Provides alloys to the weld

6. Provides metal such as iron powder for higher deposition (improve the deposits)

C. Classification of electrodes

1. First two digits tensile strength

2. Third indicates positions it can be used in

3. Fourth is current AC or DC or polarity

(Show chart on overhead)

D. Sizing of electrodes

1. 1/16 to 5/16 common diameters

2. Length is 9" to 18" common standard is 14"

VII. Welding Procedures

A. Many types of variables control the weld

1. Fixed variables

a. electrode type

1. affects the penetration of the weld

2. affects the deposit of the rod to base metal

3. affects the shape of the bead (see chart)

b. electrode size

1. larger the electrode the more current needed

2. more current is needed to get better weld penetration and depth of weld

c. current

1. melting rate of electrode is directly related to current flow

2. current flow is controlled by welder operator

a. too low a setting poor weld no depth weld doesn't penetrate

b. too high of a heat causes burn through, spatter, uneven bead

d. travel speed

1. travel too fast reduces bead width and penetration

2. too slow travel; weld build-up and contamination

e. welding voltage

1. determined by arc length

a. as length increases voltage does too

b. as length decreases voltage also decreases

c. too long an arc - spatter no weld penetration also very little shielding gas effect

f. angles of electrode

a. effects the quality of the weld

b. called the travel angle

1. increase travel angle in direction of weld will build-up bead height

2. if angle is to sharp weld will under cut

B. Pre - Weld Preparations

1. prepare weld joint

a. square off the edges

b. bevel if necessary V U J

c. clean rust, oil, grease etc.

C. Holding parts for welding

1. Make sure pieces fit properly

2. Clamp, use jig or other holding device

3. Remember the better the fit the better the weld

4. Also secure to cut down on heat distortion

VIII. Welding Defects

A. Slag inclusions

B. Wagon Tracks

C. Porosity

D. Wormholes

E. Undercutting

F. Lack of Fusion

G. Overlapping

H. Burn Through

I. Excessive Spatter

J. Cracking

IX. Welding Safety

A. Electrical Shock

1. Make sure equipment installed properly

2. All wires, leads, grounds are OK

3. Don't overload welder or cables

4. Keep cables out of slag

5. Keep out of water

B. Arc Radiation

1. Eyes need protection

a. front and back

1. reflection can hurt you

b. Need lens shade number 10 to 14

1. size of rod make difference

2. Skin protection

   a. heavy clothing

   b. sparks burn

   c. leathers

3. Air contamination

   a. electrode gives off gas

   b. working metal may have a coating

   c. work in well maintained ventilation

4. Fire and Explosion

   a. Gas, oil, paint spray, rags etc.

5. Weld cleaning process

   a. chipping slag - it's hot; wear eye protection

   b. burns metal is hot

   c. grinding and cleaning

6. Use MSDS for materials to be welded, and type of welding rod being used.

Name:

Test Welding 2

1. Name and describe some steps you must take for personal welding safety. (your clothes etc.)

2. What are the safety checks you perform on gas welding equipment? (3)

True / False

3. ___ When cutting proper angle to maintain should be 90 degrees.

4. ___ When cutting after blow through you move the tip to within 1/8" of work.

5. ___ When you are arc welding and your electrode sticks often and the bead has very little penetration that is a sign of to much amperage.

6. ___ While fabricating it is a good practice to check if everything is square by measuring from across corners.

7. What is another name for stick welding?

8. What is meant by the number on the shade lens in welding helmets? Also what lens do you use on gas and arc welding?

9. What is the difference between ac welding and dc welding?

10. What did you learn in this unit of instruction?

Name:

Final Test Welding 1
Revised: 8/20/92

1. Name and describe 5 Steps you must take for personal gas welding safety. (your clothes etc.)

2. What are the safety checks you perform on gas welding equipment? (3)

3. Describe the procedure for lighting the torch for cutting 1/4" thick steel.

True / False

4. ___ A carbonizing flame has more oxygen and is burning cooler.

5. ___ A neutral flame is hotter than an oxidizing flame.

6. ___ An oxidizing flame is best for brazing.

7. ___ When brazing you should adjust torch so it makes a loud hissing sound.

8. ___ When cutting proper angle to maintain should be 90 degrees.

9. ___ When cutting after blow through you move the tip to within 1/8" of work.

10. ___ When brazing the regulators should be set oxygen 25 psi acetylene 5 psi.

11. What is another name for stick welding?

12. What is meant by the number on the shade lens in welding helmets? Also what lens do you use on gas and arc welding?

13. What is the difference between ac welding and dc welding?

14. Define the following terms.

    6013 electrode

    7018 electrode

    SMAW

    Slag

    flux

15. You are welding and you keep burning through the base metal. What are you going to do?

16. What is a shielding gas?

17. List as many safety precautions when welding as you can.(we listed 15 in class)

18. Which of the following methods of tank identification are allowed?

    a. labels only b. color coding

    c. labels or color coding d. labels and color coding

19. What is the maximum allowed working pressure of acetylene? (gauge)

20. What safety equipment may be used to prevent fire from traveling back to the regulators or tanks?

21. What precautions must be taken before welding in a confined space?

22. What must be done first before welding on used containers?

23. Name and then describe some hazardous gases that are created while welding. (name three or more)

24. What are the hazards you should look for before welding on a vehicle?

25. When should you use hearing protection?

SECTION III

SECTION 3
DEVELOPING A HEALTH AND SAFETY PROGRAM FOR A LABORATORY

The purpose of this section is to provide guidance for establishing two laboratory-based activities: developing a health and safety program in the laboratory of the technology, and establishing a health and safety committee, both for the school and the laboratory.

Parts 1 and 2 have been reprinted from the NIOSH manual "Safety and Health for Industrial/Vocational Education". The chapters of the manual used for this section are Units 2 and 5. Some changes have been made to update the manual to current usage, and to make it applicable for use at a technical college. This section is divided into three parts: Part 1 is an overview of the organization for health and safety programs, part 2 is an overview of establishing health and safety committees, and part 3 is a brief outline of how this model will be used to establish a health and safety program in the pilot project of Automotive Technology.

PART 1 ORGANIZATION FOR HEALTH AND SAFETY PROGRAMS

Purpose of Organization

The purpose of a safety and health program organization is to help administrators develop and operate a program that will prevent and control accidents involving human, situational and environmental factors. Such a program will protect students and increase the effectiveness of instructional methods and laboratory operations.

The elimination or reduction of accidents in the school lab setting should be of primary importance to everyone in the school. A formal safety and health program will provide a means for administrators, department heads, instructors and students to accomplish safety and health objectives.

A safety and health organization which has specific functions, broad representation and administrative support can help to create a more enjoyable school atmosphere for both instructors and students. Furthermore, the image created by such a program is valuable from a public relations standpoint and furthers the school's reputation while encouraging students to enroll in the industrial/vocational education program.

The list on the next page illustrates the major components of an industrial/vocational education safety and health program.

THE MAJOR COMPONENTS OF A SCHOOL SAFETY AND HEALTH PROGRAM FOR INDUSTRIAL/VOCATIONAL EDUCATION ARE:

1. Inspection Programs
2. Maintenance Programs
3. Hazard Analysis
4. Housekeeping
5. Standard Compliance
6. Accident Investigation
7. Safety Committees
8. Hazard Recognition in Instruction & Curricula
9. Program Policy
10. Program Objectives
11. Measuring Program Effectiveness
12. Assigning Responsibility and Authority
13. Student Orientation, Training & Education
14. Supervision
15. Program Implementation

Critical to the design and organization of a safety and health program is the establishment of objectives and policy to guide the program's development.

The first step, then, is to establish specific objectives to guide the direction of the safety and health program. If the school has a safety and health committee, it would be the logical body to set objectives. Otherwise, the administration will need to appoint a special committee, including instructors, industrial/vocational education department heads and an administration representative. Among the objectives should be:

1. gaining and maintaining support for the program

2. motivating, educating, and training those involved in the program to recognize and correct or report hazards located in the laboratory area

3. engineering hazard control into the design of machines, tools and laboratory facilities

4. providing a program of inspection and maintenance for machinery, equipment, tools and laboratory facilities

5. incorporating hazard control into school training and educational techniques and methods

6. complying with established safety and health standards.

Policy Statement

Once the objectives have been formulated, the second step is for the administration or president to adopt a formal policy. A policy statement released in printed form over the signature of the highest school administrator should be made available to all school personnel. It should state the purpose behind the safety and health program and require the active participation of all those involved in the program's operation. The policy statement also should reflect:

1. the importance which the school administration places on the health and well being of its staff and students

2. the emphasis the school places on efficient operations with a minimum of accidents and losses

3. the intention of integrating hazard control into all laboratory operations

4. the necessity for active leadership, direct participation and enthusiastic support of the entire school organization

5. the intent of the school administration to bring its facilities, operations, machinery, equipment, tools, etc., within compliance with health and safety standards and regulations.

Adequate funds must be allocated in the school budget for safety and health along with those allocations traditionally associated with the training and educational process. Administrators, with assistance from their instructors and safety and health committee must define their safety and health program needs and, according to priorities, submit short and long range (three to five years) budget projections. With such projections in hand, school administrators are able to present their needs to those with fiscal responsibility and stand a better chance of acquiring what they need to make their program function.

Responsibility for the Health and Safety Program

Responsibility for the safety and health program can be established at the following levels:
1. administrators
2. department heads
3. instructors
4. students
5. student laboratory forepersons, if one has been assigned
6. purchasing agents
7. maintenance personnel
8. safety committees

Responsibilities of School Administrators

Before any safety and health programs for industrial/vocational education laboratories get underway, it is essential that such a program receive the full support and commitment of the top school administrators. Those in administration and supervision must accept full responsibility for the safety and health programs in its establishment and furnish the drive to get the program started and oversee its operations. The responsibility is the continuing obligation to carry out an effective safety and health program.

Furthermore, administrative leaders must initiate discussions with department heads, instructors and others in the program during preplanning meetings and periodically throughout the school year. Such discussions may deal with program progress, specific needs and a review of school safety and health procedures and alternatives for handling emergencies in the event an accident occurs.

Specifically, responsibility at this level appears in the form of setting objectives and policy, supporting department heads and instructors in their requests for necessary information, facilities, tools and equipment to conduct an effective laboratory program and establish a safe and healthy educational environment.

In addition, administrators must become cognizant of the fact that they are not maximizing their school's potential efficiency and effectiveness until they bring their operations within compliance with federal and state safety and health regulations, whether or not these regulations are mandatory for schools.

In order for any safety and health programs to succeed, it is necessary for those in command to delegate the necessary prerogatives to those at various levels of the school. Although responsibility cannot be delegated, authority for hazard control can be.

In Part 2, it will be shown how the administration can delegate authority to a Safety and Health Policy Committee, which includes a representative from the administration, department heads, students, and instructors. The Policy Committee reviews the recommendations it receives from the Laboratory Safety and Health Committee. In a smaller school the administration will receive directly the recommendations of the Safety and Health Committee, which will act as both the Policy and the Laboratory Committee.

While authority always must start with those in the highest administrative levels, it eventually must be delegated to other responsible people in order to achieve desired results. If department heads and instructors are to conduct a vigorous and thorough safety and health program, they are to accept and assert the authority delegated to them when circumstances warrant it, they must be fully confident that they have administrative support.

School administrators must understand that, although they can assert authority, they may find resistance unless they have enlisted support from the earliest stages of the program. If the instructors are not aware of the reasons for and the benefits of a thorough going health and safety program, they may resist any changes in their methods of operation and instruction and generally do little to assist the overall program effort.

Administrators must insist that safety and health information be included as an integral part of instructional curricula, method material and operations.

In addition, administrators must ensure that effective fire prevention and protection controls exist. For example, they must be aware of the sources of ignition within the school plant, the safety codes and regulations which pertain to the building, how the physical structure of laboratories and the school facility affects the spread of fire and the methods for detecting and extinguishing a fire should it occur.

School administrators must guarantee a system where hazard control is considered an important part of equipment purchase and process design, preventive maintenance, laboratory layout and design and so forth.

School administrators are required to safeguard employees' and students health by seeing to it that the laboratory environment is adequately controlled. They must be aware of those laboratory operations which produce airborne fumes, mists, smokes, vapors, dusts, noise, vibration, etc., that have the capacity to cause impaired health or discomfort among the student population. Administrators must be aware that occupational illnesses may begin in the school laboratory environment and may eventually take their toll during the years after the student graduates and enters industry.

In order to maintain control over the physical, chemical and biological hazards in the laboratory environment, school administrators must require a continuous monitoring system. The purpose of the monitoring program is to detect the causes of occupational illness in time to provide early and effective countermeasures. The instructor's daily monitoring has greater weight if it receives administrative backing, student participation and periodic review by the Laboratory Safety and Health Committee.

Finally, school administrators must provide meaningful criteria to providing a System of measure the success of the safety and health program and to provide information upon which to base future decisions. They must decide what the program should yield in terms of reduced accidents, injuries, illnesses and their associated losses.

Responsibilities of Department Chairpersons

The industrial/vocational education department heads are in strategic positions within the school setting. Without their full support, the best designed health and safety program will not be effective. Their leadership and influence ensure that safety and health standards are enforced and upheld in each individual area and that standards and enforcement are uniform throughout the school. Among their many responsibilities are the following:

1. to make certain that materials, equipment and machines slated for distribution to the laboratories under their jurisdiction are hazard free or that adequate control measures have been provided.

2. to make certain that equipment, tools and machinery are being used as designed and are properly maintained.

3. to keep abreast of accident and injury trends occurring in their laboratories and to take proper corrective action to reverse these trends.

4. to investigate all accidents occurring within the laboratories under their supervision.

5. to see to it that all hazard control rules, regulations and procedures are enforced in the laboratories they supervise.

6. to require that a laboratory Operations Hazard Analysis be conducted for each operation.

7. to require that hazard recognition and control information be included in each instructional module and demonstration session.

8. to actively participate in and support the policy and laboratory & Safety and Health Committee and to follow up on its recommendations.

Responsibilities of Instructors

The course instructors in industrial/vocational education carry great influence. With their support school administrators can be assured of an effective safety and health program. Instructors have a moral and professional responsibility to safeguard and educate those who have been placed under their supervision. Thus, instructors are generally responsible for creating a safe and healthy instructional setting and for integrating hazard recognition and control into all aspects of the curriculum. By their careful monitoring they can prevent accidents for which the school carries liability.

For all practical purposes the instructors, like the supervisors or forepersons in industry, are the eyes and ears of the laboratory control system. On a day to day basis, instructors must be aware of what is happening in their respective laboratories, who is doing it, how various tasks are being performed, and under what conditions. As instructors monitor their laboratories, they must be ready to change part of an operation or the entire operation if they perceive the immediate need for corrective action. The chief safety and health responsibilities of instructors are:

1. to train and educate students in work methods and techniques which are free from hazards.

2. to demonstrate an active interest in and comply with school safety and health policies and regulations.

3. to actively participate in and support the Policy and Laboratory Safety and Health Committees.

4. to supervise and evaluate student performance with consideration given to safe behavior and work methods.

5. to monitor the laboratory on a daily basis for human, situational, and environmental factors capable of causing accidents.

6. to correct hazards detected in their monitoring or to report such hazards to the persons who can take corrective action.

7. to investigate all accidents occurring within their laboratories to determine cause.

Responsibilities of Students

The students constitute the largest segment of the industrial/vocational school population and are responsible for making the safety and health program succeed. Well trained and educated students who actively participate in the safety program are probably the greatest deterrent to damage, injuries, and death in the industrial/vocational school laboratory. The most common student responsibilities are:

1. to obey school safety and health rules and regulations and work according to standard laboratory practices.

2. to recognize and report to the instructor hazardous conditions or work practices in the laboratory.

3. to use protective and safety equipment, tools and machinery as they were designed.

4. to report all injuries or exposure to toxic material to the instructor as soon as possible.

In a well balanced industrial/vocational education safety and health program which includes active participation by the student, a student sometimes serves as the student laboratory foreperson. The job of the foreperson is to inspect, detect and correct. The specific responsibilities of the student laboratory foreperson are:

1. to encourage fellow students to comply with laboratory safety and health regulations.

2 to detect unsafe practices and hazardous machinery, tools, equipment, etc.; to take corrective action when possible; and to report to the instructor the hazard and the active action taken or still required.

3. to participate in accident investigations.

4. to represent students on the Laboratory Safety and Health Committee

Responsibilities of Purchasing Agents

Those responsible for purchasing items for the industrial/vocational education laboratories, whether they be department heads or specially designated persons, are in a key position to help reduce hazards associated with school laboratory operations. Among the specific responsibilities of those who purchase items are:

1. to be certain that tools, equipment and machinery are ordered and purchased with adequate consideration for student health and safety and with adequate protective devices.

2. to obtain adequate information on the health hazards associated with substances and materials used in laboratory operations.

Responsibilities of Maintenance Personnel

Those involved with maintaining equipment, machinery and facilities play an important role in reducing accidents in the industrial/vocational laboratory. Among the responsibilities of those in maintenance are:

1. to perform construction and installation work in conformance with good engineering practices.

2. to comply with acceptable safety and health standards.

3. to provide planned preventive maintenance on electrical systems, machinery, equipment, etc., to prevent abnormal deterioration, loss of service, or safety and health hazards.

4. to provide for the timely collection and disposal of scrap materials and waste.

5. to actively participate in and support the Laboratory Safety and Health Committee.

Responsibilities of the Health and Safety Committee

In Part 2 of this section, the role of school safety committees in the overall safety and health program will be examined. The Policy Committee as well as the Laboratory Safety and Health Committees are made up of department heads, maintenance personnel, instruction, students, and administration representatives. Among their responsibilities are:

1. to survey laboratory facilities for safety and health hazards

2. to advise administration of safety and health hazards found and to offer recommendations for their correction.

3. to promote and evaluate laboratory programs in the recognition

of safety and health hazards.

4. to critically examine laboratory safety and health practices and the safety information contained in materials and curricula.

5. to evaluate the acceptability of safety devices and personal protective equipment to be purchased for the school laboratories.

6. to conduct accident investigations.

PART 2
SAFETY AND HEALTH COMMITTEES

Introduction

As examined in Part 1, the reduction or elimination of hazards in the industrial/vocational education laboratory cannot be delegated to a single group but instead must involve the active participation and cooperation of many key people in the school organization. Like any other kind of committee, the safety and health committee can either provide a valuable service or end up as nothing more than a social circle which is neither productive nor efficient. What makes one committee highly effective while another fails? The answer lies in part with the original purpose of the committee, how well it is structured and staffed, and the support it receives while carrying out its responsibilities.

Purpose

In this unit the basic types of safety and health committees used in industrial/vocational education will be examined: what they should be, how they should work, and how they should be organized and managed in order to ensure that they function productively and efficiently.

What is a Health and Safety Committee?

A safety and health committee is a group appointed to aid and advise the school administration on matters of safety and health pertaining to laboratory operations. In addition, it performs essential monitoring, educational, investigative and evaluative tasks. The committee, depending on its type, is composed of members of the school administration, instructors, department heads, maintenance personnel and students.

If the industrial/vocational education program has any formal safety program at all, it is usually small and limited. Too often, staff must sandwich in safety and health with other activities. Such a system lacks coordination; each person delegated responsibilities for safety and health is left pretty much on his/her own to provide for and maintain a safe and healthy laboratory setting. The results of such a program are usually less than desirable.

Value of Committees

To establish and maintain a safety and health program of high quality, the full cooperation of everyone in the school organization are required. The safety and health committee is a vehicle for obtaining this cooperation while effectively and efficiently distributing the work load so that a few people in the school do not have to carry the whole safety and health burden by themselves. Committees provide an official channel and forum for

combining the knowledge and experience of many people in order to accomplish the objectives of reducing hazards and losses. Safety and health committees provide a means whereby hazard information and suggestions for hazard control can travel between the laboratory and the school administration. Committee members can translate their ideas into actions. Because the information flow is facilitated, administrators can process problems and take action more expediently.

Committees by their very nature encourage a close relationship between school administrators, department heads, instructors and students. The benefits of this close relationship can be found not only in greater attention to safety and health and a finer understanding of hazard control but also in higher school morale. Because they facilitate communication, safety and health committees provide an excellent means for maintaining school morale at a high level.

Perhaps the greatest value of all is that committees force many minds to address a problem simultaneously. With so much "thinking power" working on problems, effective solutions are produced.

Types of Health and Safety Committees

There are two basic types of safety and health committees used in industrial/vocational education settings: 1) policy and 2) laboratory committees. In a smaller school these two committees may need to be combined into one group of six to eight persons, representing administration, department heads, instructors, students and maintenance personnel.

The Safety and Health Policy Committee ideally would be composed of a high level administrator, at least one representative from the department heads, instructors, students, and a representative from the faculty association where applicable. The work of this committee includes:

1. identifying, defining and studying those problems which have a significant impact on the safety and health of school staff and students

2. studying safety and health implications of interdepartmental functions and of changes in procedures and processes.

3. acting on or evaluating the effectiveness of recommendations from the Laboratory Safety and Health Committee

4. assessing recommendations in the light of appropriations and setting priorities for expending funds to improve safety and health in the school

5. reviewing and updating all school rules and regulations applicable to safety and health

6. promoting and evaluating training and education in hazard recognition and control

7. standardizing disciplinary courses of action for noncompliance with school safety and health rules and regulations

8. reviewing accident reports

9. reviewing beneficial suggestions to improve safety and health.

The Safety and Health Policy Committee also gives guidance to the Laboratory Safety and Health Committee, to which it refers specific tasks.

The Laboratory Safety and Health Committee is the group that promotes safety and health at the laboratory level. It should consist mainly of the students who will be working in the laboratory. If needed, there also should be representation of department heads, instructors, maintenance personnel, student laboratory forepersons and, when applicable, a faculty association representative. The work of this committee includes:

1. conducting periodic laboratory inspections to detect hazardous physical and environmental conditions, unsafe procedures and practices

2. studying and evaluating accident and injury data

3. investigating all accidents occurring in the school and preparing reports

4. conducting safety and health training and evaluation programs

5. conducting hazard analyses of all laboratory processes and operations

6. reviewing and upgrading laboratory curricula, instructional methods and materials

7. field testing safety and health equipment and making recommendations to the Policy Committee

8. studying the implications of changes in laboratory processes, operations and tasks

9. recommending actions to be taken by the Policy Committee to eliminate or reduce hazards

10 considering ways and means of improving the effectiveness of rules, regulations, procedures, etc., to promote safety and health in the school

11 promoting first aid training for all school staff.

The top school administrator must keep in mind two important requirements in organizing the committee: first, to keep the committee small and effective; and second, to appoint a chairperson who is respected and who demonstrates interest in the area of safety and health. The administrator must impress upon the chairperson that committee members, no matter how good their intentions, should be constantly motivated and encouraged to take on additional responsibilities while still maintaining their work, planning, instructional and evaluative duties. Thus, the person selected to chair the committee must be "sold" on the purposes of and the results to be gained from a school safety and health program.

The ideal size of the Policy Committee would be about six people, representing administration, department heads, instructors and teachers' association representative. The committee should be structured so that a member of the administration is an ex- officio member of the Policy Committee. The Laboratory Safety and Health Committee, including as it does student representatives and maintenance personnel, might range in size from six to ten persons. The committees should be of manageable size so that each member will have the opportunity to participate. Committee membership should be staggered so that the term of office of all committee members does not expire at the same time, destroying the continuity of committee programs.

Educating and Training Committee Members

Committee members will for the most part need safety and health training and education before they can be effective. Consequently, administrators must see to it that committee members receive basic instruction in the principles and techniques of hazard recognition and control. The NIOSH manual has many elements that can be used to increase the knowledge and skill of committee members. The units on inspections, hazard analysis, accident investigations and several of the technical units are highly recommended for use in training and educating committee members.

Procedures for Recommendations

To arrive at recommendations, the health and safety committee needs an established procedure. In schools with only one safety and health committee recommendations will go directly to the administration. In schools with two committees, the Laboratory Safety and Health Committee will make its recommendations to the Policy Committee, to which the administration has delegated its authority.

The following procedures are suggested:

1. When a committee member makes a recommendation, it should be discussed by the entire committee to determine if the recommendation is acceptable, if it needs modification before

being submitted to the school administration or Policy Committee, or if it should be rejected.

2. Any recommendation regarding safety and health in industrial/vocational education must be referred directly to the laboratory Safety and Health Committee. A recommendation received from outside the committee should be subject to the same procedure described above: committee discussion, leading to acceptance, modification or rejection.

3. Recommendations which have bean accepted by the committee should be submitted in writing to the school administration or Policy Committee.

   a. Recommendations should state what is to be done, by whom and when (the date it is to be completed). Committees should avoid making recommendations to do something "at once," "as soon as possible," "when funds are available," "when convenient" and so forth. Such recommendations are either too demanding or too vague and transfer the responsibility of deciding priorities to the doer.

   b. The written statement should explain why a course of action is recommended, information which also should be included in the committee meeting minutes. Such explanations should make clear in what way the recommended action will reduce or eliminate hazards and improve safety and health within the school.

   c. How the recommendation is to be carried out should be stated only if "method" is a condition of the recommendation.

Conducting Committee Meetings

The chairperson of the laboratory Safety and Health Committee should establish a date and time for each committee meeting, taking into account the schedules of members. The committee should meet at least once a month and carry out assignments between meetings. The Policy Committee meets as needed, at the discretion of its chairperson and the school administration.

At least five days in advance of a committee meeting, notice of the meeting and the agenda should be sent to each committee member. By receiving the agenda beforehand, committee members have time to think about the topics to be considered and organize their ideas and opinions at a leisurely pace. A good practice is to include with the agenda a copy of the minutes of the last meeting.

Whenever possible, meetings of the laboratory Safety and Health Committee should be held to one hour. In order to accomplish an entire agenda in that time, the committee chairperson must take time beforehand to organize the business at hand into a tight schedule.

During committee meetings, the chairperson must keep the program on course. It is easy for the chairperson, as coordinator, to slip out of the leader's role and find themselves doing the leg work of committee members. When the chairperson steps out of his/her role, even for a short period of time, he/she frustrates the members. On the other hand, if the chairperson conducts meetings in such a manner that he/she makes all the recommendations themselves, the role of the committee is destroyed. Instead of the members jointly participating in decisions, they are forced into accepting one person's opinions. If such a situation is allowed to continue, the effectiveness of the committee will be drastically reduced and soon committee members will refuse to participate.

The committee should adopt a formal set of rules to govern the conduct of the meeting.

Committee meetings are more productive when minutes of proceedings are kept. These minutes need not be elaborate but should be complete and informative and should be reviewed by a member of the administration after each meeting. Minutes taken by the committee secretary should follow a pattern similar to the following:

1. date of meeting
2. time meeting opened
3. members present
4. members absent
5. minutes of previous meeting read and approved or disapproved
6. unfinished business (including issues involving recommendations not yet resolved)
7. recommendations completed since last meeting
8. new business (including discussion of inspections and hazard analyses made)
9. new recommendations
10. listing and discussion of accidents which occurred since last meeting (date of injury, student, instructor, school employee, cause, recommendations, etc.)
11. other committee remarks
12. committee resolutions
13. time meeting adjourned and date of next meeting
14. secretary's signature

15. space for signature of reviewing official and date.

Effectiveness of Health and Safety Committees

The effectiveness of health and safety committees depends on several factors:

1. Regular meeting times and regular attendance at meetings.

2. Committee members must be sincerely interested in the school safety and health program and willing to cooperate with others to improve that program.

3. Committee recommendations and suggestions must be considered and acted upon. If the committee becomes a showpiece with no real authority or support, it should be disbanded and a fresh start made.

4. The committee's work and accomplishments should receive recognition, either by means of public announcement or private letters of commendation. An effective chairperson will express his/her appreciation for the contributions and expertise of committee members.

PART 3

DEVELOPING A HEALTH AND SAFETY PROGRAM FOR A PILOT TECHNOLOGY

The pilot program, Automotive Technology, will develop a health and safety program using Part 1 of this section. A college-wide health and safety committee has already been established at Central Maine Technical College; this committee will help in the development in the pilot project. The Automotive Technology will use Part 2 of this section to develop and implement a laboratory health and safety committee, commencing in the Fall, 1992.

The department will:

1) Develop a written health and safety policy for the technology. Part 1 of this section will be used in development.

2) Develop and implement the roles and responsibilities of the health and safety committee. The following activities will be implemented:

   a) hazard evaluation

   b) assigning responsibility

   c) developing methods to eliminate hazards

   d) developing educational awareness programs around health and safety issues

   e) installation of officers on the committee; how will the chairperson, recording secretary, and other members of the committee be selected?

   f) develop and implement a hazard communication program

   g) other duties as warranted

SECTION IV

SECTION 4

LEARNING MATERIALS

HOW INDIVIDUALS LEARN

The "new type of health and safety education" promoted in this project suggests that learner-focused approaches to instruction be used. Health and safety education research has shown that knowledge acquisition alone will not lead to healthy and safe behaviors. Effective lessons allow the learner to acquire and apply knowledge through active learning experiences. The materials provided by this project are to be a supplement to the learning experience in the classroom and laboratory. These materials will be only be as effective as the reinforcement they are given in the classroom and laboratory. Instruction should also be provided using diverse strategies to ensure that all learning style characteristics are addressed.

Research has shown that there are two major differences in how individuals learn (McCarthy, 1988, Kansas Guidelines, 1991). People perceive reality differently and also process information and experiences differently.

Some individuals perceive reality concretely by relying heavily on senses and feelings. Others perceive reality by logically thinking through the experience. Individuals fall at many different places on a continuum in perceiving reality.

Perception alone does not equal learning. The learner must also process the experience or information. Some individuals process information better through active participation while others tend to process through reflective observation. As with perception, people tend to process information at different places on a continuum.

For a learner to internalize information, a cycle of learning occurs. The learner must process the experience by:

1) identifying feelings and thoughts about the experience

2) analyzing the experience for significance and meaning

3) generalizing the experience for application

Instructors can address all learning styles by using diverse strategies in the cycle of learning. The materials purchased for this project will augment the instructional and experiential learning of the technology.

Following is a list of materials purchased for this project:

1) Videos
   a) Meridian Education Corporation - "Auto Shop Safety"
   b) National Fire Protection Association - "Fire Extinguishers: Fight or Flight"
   c) Long Island Productions:
      1. "Back Care and Lifting Safety"
      2. "Hand, Finger, and Wrist Safety"
      3. "Hand and Power Tool Safety"
      4. "Eye Protection and Safety"
      5. "Hearing Protection and Safety"
      6. "Respiratory Protection and Safety"

2) Brochures
   a) Business and Legal Reports, Inc.:
      1. "How to protect your Hands on the Job"
      2. "Working Safely with Solvents"
      3. "Lifting Safely"
   b) National Safety Council - "Safety Awareness"

SECTION V

SECTION 5

LIST OF RESOURCES AND APPENDICES

Part 1 consists of a list of resources for the Automotive Technology that can be used to obtain information relating to occupational health and safety.

Part 2 of this section, the Appendices and Bibliography, is a list of materials and documents used in the preparation of this project. Surveys to measure outcomes, perceptions and needs are included in this part. The Occupational Health and Safety Department of Central Maine Technical College again wishes to extend its appreciation to the Kansas Board of Education for its permission to reprint its "Kansas Outcomes-Based Health Education Guidelines". These guidelines have been modified for this project to reinforce safety concepts, as well as to make the guidelines applicable to technical colleges, both in the classroom and laboratory.

PART 1
LIST OF RESOURCES

Thomas J. Anton. "Occupational Safety and Health Management". 2nd ed. McGraw-Hill, New York. 1989

Industrial Hygiene/New England. "Occupational Health Hazards for the Automotive Repair Trades". Biddeford, Me. 1992.

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PART 2
APPENDIX AND BIBLIOGRAPHY

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U.S. Department of Labor, Bureau of Labor Standards, Safety Organization, Bulletin 285, 1967.

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APPENDIX A

The Maine Auto Dealers Association and the Department of Occupational Health and Safety of Central Maine Technical College developed and mailed an occupational health and safety survey to auto dealerships throughout the state of Maine. A copy of the memorandum and survey accompany this appendix. A summary of the survey appears at the end of Appendix A.

MEMO

DATE: December 9, 1991

TO: Steve Piper
Maine Auto Dealers Association

FROM: Thomas Ryan, Center for Occupational
Health and Safety, CMTC

RE: Automotive Tech. Safety Survey

Central Maine Technical College, Department of Occupational Health and Safety is conducting an assessment of needs concerning safety and health for our automotive students. The curriculum in Automotive Technology will be revised based on this assessment. Please take a few minutes to fill out the attached questionnaire and send them back to the Department. If you have any questions, please contact Tom Ryan at 784-2385, ext. 287.

Thank you

HEALTH AND SAFETY SURVEY FOR AUTOMOTIVE TECHNOLOGY

This survey is designed to address needs in a Safety and Health Curriculum in the Automotive Technology Department of Central Maine Technical College. The survey will be kept confidential and is for research only.

Regarding your employees:

1. In general, how would you rate your employees' awareness of occupational safety in the workplace?

   a. excellent b. good c. fair d. poor

2. In general, how would you rate your employees' awareness of occupational health in the workplace?

   a. excellent b. good c. fair d. poor

3. In general, how would you rate your employees' attitude concerning occupational safety?

   a. excellent b. good c. fair d. poor

4. In general, how would you rate your employees' attitude concerning occupational health?

   a. excellent b. good c. fair d. poor

This section concerns employees who have graduated from a vocational or technical school.

5. How would you feel the graduates of vocational-technical education are trained in occupational safety?

   a. excellent b. good c. fair d. poor

6. How do you feel the graduates of vocational-technical education are trained in occupational health?

   a. excellent b. good c. fair d. poor

7. If you compared the graduates of vocational-technical schools with those who did not attend any formal training, how would you describe their level of occupational safety awareness and competency?

   a. same b. more c. less

8. If you compared the graduates of vocational-technical schools with those who did not attend any formal training, how would you describe their level of occupational health awareness and competency?

   a. same b. more c. less

Below is a list of areas in occupational safety and health education in Automotive Technology. Please circle the response you feel is most appropriate.

	More Training Required	Have Adequate Training
1. Proper Lifting- prevention of back injuries	1	2
2. Hoisting equipment	1	2
3. Flammable Materials Handling	1	2
4. Hand Tool Safety	1	2
5. Asbestos Awareness	1	2
6. Personal Protective Equipment	1	2
7. Chemical Awareness and Handling	1	2
8. General Motor Vehicle Safety	1	2
9. Lock-Out/Tag-Outs	1	2
10. Health Effects of Solvents	1	2
11. Electrical Safety	1	2
12. Health and Safety in Spray Booths	1	2
13. Hazards of Carbon Monoxide - Carbon Dioxide	1	2
14. Ventilation	1	2
15. Hydraulic Safety	1	2
16. Respiratory Health	1	2
17. Burns	1	2
18. Health Surveillance System-Drug Awareness	1	2

	More Training Required	Have Adequate Training
19. Hazards of Airborne dust	1	2
20. Machine Guarding	1	2
21. Fire Protection	1	2
22. Welding & Burning Hazards	1	2
23. Confined Spaces	1	2
24. Hazardous Waste	1	2
25. Cadmium & Chromium Exposures	1	2
26. Work Practices and Procedures	1	2

If you were to prioritize this list, would you please name the 5 areas of most concern?

1. _____

2. _____

3. _____

4. _____

5. _____

SUMMARY OF THE SURVEY

125 surveys were sent to the Maine automotive dealers. There were 21 responses. Because of the low number of returns, care should be taken in the analysis of the data. 2 numbers are used; the first indicates the percentage, the second, in parentheses, is the raw score. The summary results are based on 21 responses. However, some questions were not answered by all the respondents; the scores have been adjusted for these questions.

HEALTH AND SAFETY SURVEY FOR AUTOMOTIVE TECHNOLOGY

Regarding your employees:

1. In general, how would you rate your employees' awareness of occupational safety in the workplace?

a. excellent	b. good	c. fair	d. poor
a.5% (1)	b.76% (16)	c.19% (4)	d.0% (0)

2. In general, how would you rate your employees' awareness of occupational health in the workplace?

a. excellent	b. good	c. fair	d. poor
a.0% (0)	b.71% (15)	c.24% (5)	d.5% (1)

3. In general, how would you rate your employees' attitude concerning occupational safety?

a. excellent	b. good	c. fair	d. poor
a.0% (0)	b.76% (16)	c.24% (5)	d.0% (0)

4. In general, how would you rate your employees' attitude concerning occupational health?

a. excellent	b. good	c. fair	d. poor
a.0% (0)	b.62% (13)	c.38% (8)	d.0 (0)

This section concerns employees who have graduated from a vocational or technical school.

5. How would you feel the graduates of vocational-technical education are trained in occupational safety?

a. excellent	b. good	c. fair	d. poor
a. 10% (2)	b.81% (17)	c.5% (1)	d.0% (0)

6. How do you feel the graduates of vocational-technical education are trained in occupational health?

a. excellent	b. good	c. fair	d. poor
a. 10% (2)	b.71% (15)	c.10% (2)	d.0% (0)

7. If you compared the graduates of vocational-technical schools with those who did not attend any formal training, how would you describe their level of occupational safety awareness and competency?

a. same b. more c. less
a.24% (5) b.67% (14) c.5% (1)

8. If you compared the graduates of vocational-technical schools with those who did not attend any formal training, how would you describe their level of occupational health awareness and competency?

a. same b. more c. less
a.23% (5) b.57% (12) c.10% (2)

Below is a list of areas in occupational safety and health education in Automotive Technology. Please circle the response you feel is most appropriate.

	More Training Required		Have Adequate Training	
1. Proper Lifting-prevention of back injuries	1	71% (15)	2	29% (6)
2. Hoisting equipment	1	38% (8)	2	62% (13)
3. Flammable Materials Handling	1	48% (10)	2	52% (11)
4. Hand Tool Safety	1	14% (3)	2	86% (18)
5. Asbestos Awareness	1	43% (9)	2	57% (12)
6. Personal Protective Equipment	1	48% (10)	2	52% (11)
7. Chemical Awareness and Handling	1	67% (14)	2	33% (7)
8. General Motor Vehicle Safety	1	19% (4)	2	81% (17)
9. Lock-Out/Tag-Outs	1	29% (5)	2	71% (12)
10. Health Effects of Solvents	1	71% (15)	2	29% (6)
11. Electrical Safety	1	33% (7)	2	67% (14)
12. Health and Safety in Spray Booths	1	33% (5)	2	67% (10)

	More Training Required		Have Adequate Training	
13. Hazards of Carbon Monoxide - Carbon Dioxide	1	43% (9)	2	57% (12)
14. Ventilation	1	24% (5)	2	76% (16)
15. Hydraulic Safety	1	10% (2)	2	90% (19)
16. Respiratory Health	1	52% (11)	2	48% (10)
17. Burns	1	38% (8)	2	62% (13).
18. Health Surveillance System-Drug Awareness	1	48% (10)	2	52% (11)
19. Hazards of Airborne dust	1	43% (9)	2	57% (12)
20. Machine Guarding	1	38% (8)	2	62% (13)
21. Fire Protection	1	14% (3)	2	86% (18)
22. Welding & Burning Hazards	1	29% (6)	2	71% (15)
23. Confined Spaces	1	24% (5)	2	76% (16)
24. Hazardous Waste	1	52% (11)	2	48% (10)
25. Cadmium & Chromium Exposures	1	52% (11)	2	48% (10)
26. Work Practices and Procedures	1	43% (9)	2	57% (12)

If you were to prioritize this list, would you please name the 5 areas of most concern?

1. _____
2. _____
3. _____
4. _____
5. _____

The responses to this section were varied. However, 10 respondents stated back injury prevention was the #1 priority.

APPENDIX B

QUESTIONNAIRES AND SURVEYS USED IN THE DEVELOPMENT OF THE PROJECT

CRITERIA FOR SELECTING HEALTH AND SAFETY EDUCATION CURRICULA

CRITERIA	YES	TO SOME DEGREE	NO/N.A.	COMMENTS
OUTCOMES				
1. Are learner-focused outcomes provided?				
2. Are the identified outcomes measurable?				
3. Do the outcomes relate to the program technology outcomes?				
4. Do identified outcomes reflect cognitive, affective, and behavioral learning?				
CONTENT OF MATERIALS				
1. Is the content developmentally appropriate?				
2. Does the content reflect a positive approach for acquiring knowledge, skill practices, and values for healthy and safe work practices?				
3. Does the content reflect continuity and progression from one unit level to the next?				
4. Are materials flexible to allow the content to be taught through integrated instruction?				
5. Is the content free from gender, minority and socioeconomic biases?				

CRITERIA	YES	TO SOME DEGREE	NO/N.A.	COMMENTS
6. Is assessment of student learning included?				
7. Have the materials been documented for effectively impacting healthy and safe knowledge, skills, values, and practices?				

****Adapted from "Criteria for Comprehensive Health Education Curricula" by the Southwest Regional Laboratory, used in the Kansas State Guidelines. Modifications were made to incorporate safety in the criteria.****

Staff Development Needs Assessment Form

Please put a check in the area that you feel most accurately describes your assessment.

	I am capable in this area	I need help obtaining information, skills and resources
1. Definition and philosophy of health and safety education		
2. Rationale for college health and safety education		
3. Regulations for health and safety education		
4. School policy about health and safety issue		
5. Identifying critical and emerging health and safety issues		
6. Elements of health and safety effective program		
7. The curriculum planning process		
a. program exit learner outcome		
b. writing program outcomes		
c. integrated and direct instruction		
d. Allocating instructional time		

	I am capable in this area	I need help obtaining information, skills, and resources
8. Implementation of the plan		
a. Selecting instructional materials		
b. Preparing lesson plans		
c. Effective teaching strategies		
9. Evaluation of:		
a. Student learning		
b. Instruction		
c. Program		
10. Reinforcing instruction outside the classroom		

****Adapted from the Kansas State Board of Education Publication: "Kansas Outcomes-Based Health Education Guidelines" 1991****

Checklist for Sample Process Objectives

Complete the assessment using the following key:

A. Completed entirely

B. Completed, but improvement is needed

C. Currently being completed or is being considered for completion

D. Not completed and not being considered for completion

Program Development

____ 1. Needs of students will be identified through the use of audits, and students assessments.

____ 2. Advisory groups and trade associations will be involved in decisions regarding integration of safety and health across the curriculum.

____ 3. An outcomes-based curriculum plan will be written by the program faculty with assistance from a faculty member of the Occupational Health and Safety Department.

____ 4. A schedule for allocation of direct and integrated health and safety instructional time will be planned in each program.

____ 5. Instructors will plan lessons to address outcomes identified in the curriculum plan.

____ 6. College policy and mission statement will be reviewed to determine degree of support for health and safety instruction.

____ 7. A health and safety committee will be formed by each technology.

Program Implementation

____ 1. Needs will be incorporated in the program planning process.

____ 2. Meetings will be held with advisory groups; surveys will be sent to Trade Association.

____ 3. Instructors and staff will be provided training to implement the plan.

____ 4. Instructors will deliver health and safety instruction, as necessary.

____ 5. Instructors will facilitate lessons using multiple strategies and addressing all learning styles.

____ 6. Policy and mission rewritten to incorporate health and safety.

____ 7. A review of the department committee will be conducted by the school health and safety committee.

****Adapted from the Kansas State Board of Education Publication: "Kansas Outcomes-Based Health Education Guidelines" 1991****

Questionnaire for Measuring the Perceptions of Instructors

Complete the responses using the key below. Please do not write your name on this form.

KEY:
SA= Strongly Agree
A= Agree
U= Uncertain
D= Disagree
SD= Strongly Disagree

1. I am fairly knowledgeable about health and safety in the workplace.
(circle one) SA A U D SD

2. I am confident that I can deliver occupational health instruction that meets the needs of my students and my technology

(circle one) SA A U D SD

3. Students I teach are at risk to chemical exposures in the laboratory of the technology.

(circle one) SA A U D SD

4. Instructors should not have to deal with the emotional needs of students.

(circle one) SA A U D SD

5. Health and safety education should not address personal risk behaviors.

(circle one) SA A U D SD

6. Health and safety education will make a difference in the behavior of students.

(circle one) SA A U D SD

7. Health and safety education should focus on teaching students how to avoid risky behaviors, as opposed to analyzing unhealthy and unsafe conditions.

(circle one) SA A U D SD

8. Health and safety education should teach students decision - making skills.

(circle one) SA A U D SD

****Adapted from the Kansas State Board of Education Publication: "Kansas Outcomes-Based Health Education Guidelines" 1991****

APPENDIX C - "KANSAS OUTCOMES-BASED HEALTH EDUCATION GUIDELINES: A MULTI-LEVEL APPROACH FOR PROGRAM AND CURRICULUM DEVELOPMENT": ADAPTED FOR POST-SECONDARY VOCATIONAL/TECHNICAL EDUCATION

SECTION I
METHODS FOR INTEGRATING HEALTH AND SAFETY INTO THE CURRICULUM

CONTENTS

INTRODUCTION

CHAPTER 1: HEALTH AND SAFETY EDUCATION

- Mission of Education
- Goals of the Program
- Philosophy
- Elements of Effective Health and Safety Educational Programs

CHAPTER 2: THE CURRICULUM PLANNING PROCESS

- The Curriculum Plan
- Steps for Writing the Curriculum Plan
- Content of the Curriculum Plan
- Planning for Allocation of Instructional Time

CHAPTER 3: OUTCOMES OF SCHOOL HEALTH AND SAFETY PROGRAMS

- Outcomes-Based Education Process
- Program Goals and Outcomes
- Indicators of Student Achievement of Outcomes
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CHAPTER 4: IMPLEMENTATION OF THE HEALTH AND SAFETY EDUCATION CURRICULUM PLAN

Implementing the Curriculum Plan

Sample Criteria for Selecting Health and Safety Curriculum

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Lesson Planning

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CHAPTER 5: EVALUATION

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Integrated Health and Safety into a Technology Program

Selecting Appropriate Measures

Sample Measures

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Healthy and Safe Lifestyles: A Multi-Level Approach for Developing a Comprehensive Health and Safety Program

Healthy Lifestyles Model

Healthy and Safe Laboratory Mode

Potential Services Coordinated by a School Health and Safety Committee

CHAPTER 1: HEALTH AND SAFETY EDUCATION:

Mission of Education

Goals of the Program

Philosophy

Elements of Effective Health and Safety Education Programs

Mission Of Education

The mission of education is to prepare each person with the living, learning and working skills and values necessary for caring, productive, and fulfilling participation in our evolving, global society. In the state of Maine, we have missed a task in our educational obligations: to provide our students with the knowledge and skills necessary to accomplish this mission in a healthy and safe manner which will protect the person, their fellow employees, and the environment in which they work. The recommendation of this project is to deliver health and safety education through a combination of direct and integrated instruction involving the school, home and community.

The Goals of the program are that a student:

1. knows how to be healthy and safe.
2. acquires the essential skills necessary to lead a healthy and safe life.
3. values the importance of a healthy and safe lifestyle.
4. demonstrates healthy and work practices.

Philosophy

A comprehensive school health and safety program needs to be developed. An effective program creates an environment that promotes healthy and safe behavior. This program, to be effective, needs to be administered at all levels of the institution. There must be a policy statement from the Administration demonstrating the commitment to health and safety. The program on campus needs to be integrated into the community and workplace. To quote from the Centers for Disease Control (1990): (Kansas Guidelines, 1991) "A comprehensive program developed collaboratively by the school and the community may more effectively impact the physical, mental, and emotional needs of the student." There is a need to eliminate behaviors that occur in occupation al exposures that result in unintentional and intentional in juries and illnesses, as well as those that occur outside the workplace. This behavior needs reinforcement at the educational level.

Elements of Effective Health and Safety Educational Programs should include:

1. Curriculum that is behavior-focused.

   In some cases behavior modification concerning Health and Safety will be required.

2. Curriculum that is skills-based. Students will acquire:

   a) Skills for Safety and Health.

   b) Skills to identify high risk situations.

   c) Skills to avoid high risk situations.

   d) Skills to take protective actions in high risk situations which can cause acute and chronic illnesses.

   e) Skills to modify situations to reduce risk.

3. Continuity: repeated, consistent instruction produces a higher impact.

4. Enough time must be devoted to introducing new health and safety skills.

5. The instruction must be delivered by trained personnel.

   a) Studies by the Kansas Board of Education indicate teachers not specifically trained as health educators provided meaningful instruction with a minimum of nine hours of in-service training.

   b) Instructors will need annual update sessions to review curriculum and to improve teaching skills in health and safety.

   c) Studies show that educators who participated in training implemented the curriculum to a greater extent than those who did not receive training.

6. School policy supporting health and safety instruction.

   There must be commitment from all levels of the school regarding health and safety.

7. Involvement of peers in program decisions and leadership increases effectiveness.

   Such methods as cooperative education, participation in health and safety committees, and campus-wide health and safety programs will enhance the delivery of health and safety instruction.

The Kansas Board of Education has many examples of successful student health programs, but research found no programs for students to promote a healthy and safe workplace environment. Filling this gap is the goal of this program.

Chapter 2 THE CURRICULUM PLANNING PROCESS ELEMENTS:

The Curriculum Plan.

Steps for Writing the Curriculum Plan.

Content of the Curriculum Plan.

Planning for Allocation of Instructional Time.

The Curriculum Plan

Coincidental with integrating health and safety into the curriculum, a goal of an ideal program should be the development and delivery of direct instruction in health and safety. A well written health and safety education curriculum plan is particularly important when combining direct instruction through safety and health education classes and integrated instruction provided in the field of the technology. Since direct instruction programs have already been developed and delivered at the College, and are outside the scope of this grant, the majority of time spent in development will be devoted to integration into a technology.

In the Kansas plan, the establishment of a committee for health and safety is recommended. The purpose of the committee is to develop a health and safety program campus-wide. Students, faculty, and staff need to have education relating to health and safety at all levels of their activities on campus. All employees of the College will be made aware of the health and safety program; students find extremely mixed messages when health and safety instruction is presented to them, but they observe unhealthy and unsafe activities by faculty and staff.

Steps for Writing the Curriculum Plan.

1. Conduct a needs assessment.

    a) Review of state, national and locally developed materials on curriculum integration.

    b) Review the needs of the instructors to provide health and safety education.

    c) Conduct a survey of the technology employers to review their needs for health and safety education.

    d) Conduct a health and safety audit of the laboratory of the technology.

    e) Evaluate the accident rate of the trade or technolo gy

2. Review current literature for up-to-date information on effective health and safety programs. This could consist of contacting various education departments for curriculum material, soliciting and reviewing curriculum guidelines from the National Institute for Safety and Health (NIOSH), and review of journals in the field of occupational health and safety.

4. Conduct a study of the amount of health and safety education now being provided; if available, review the results of past evaluations.

5. Work with the Health and Safety Committee to write or revise a health and safety program for the laboratory of the Technology.

6. Solicit review from the technology's advisory committee, students, and health and safety professionals.

Content of the Curriculum Plan:

A curriculum plan should include:

1) Philosophy of the health and safety education program

a) What should the program provide?

b) How should the program be delivered?

3) Health and safety education program outcomes

What knowledge, skills, practices, and values should the student acquire as a result of being in the program?

4) Indicators of student achievement of the outcomes.

What indicators can assist in determining when a student has achieved the knowledge, skills, practices and values?

5) Level outcomes.

What knowledge, skills, practices, and values should a student exhibit at specific stages of the plan?

6) Integration of outcomes across disciplines.

Where will the health and safety education for the technology occur? Identifying in each segment of instruction where the education is to occur can prevent duplication of instruction and avoid omitting essential parts of the material.

7) Time allocation for health and safety Instruction.

8) Instructional Materials:

   a) What instructional materials will be used?

   b) Selection of instructional materials should be made <u>following</u> identification of outcomes and allocation of instructional time.

9) Method of Evaluating the Program:

   a) How will the program be evaluated?

   b) What assessment procedures will be used to collect information used for program improvement?

Planning for Allocation of Instructional Time

1) Consideration of the curriculum of the Technology is vital in planning integration. However, the goal of the integration should be to implement health and safety in a manner in which the content is synthesized with the curriculum of the technology. The more successful the integration, the less time will be <u>specifically</u> required for safety and health instruction. By planning instruction as described, there needs to be no time or a minimal amount of time specifically allotted to health and safety education in the Technology.

2) For direct instruction, the requirement for an introductory course in health and safety will conform to the college's standard system - a 3 credit course consisting of 45 classroom hours, usually delivered over 15 weeks. All efforts should be made to make the introductory 3 hour course part of the requirements for graduation from the Technology. Presently, CMTC's Occupational Health and Safety Department offers am introductory occupational health and safety course. However, it is an elective in most technologies.

3) In the laboratory, certain time should be given to the development of a health and safety program. Time spent will be dependent on the needs of the technology and the stage of development regarding health and safety. An example is provided in Section 3: Developing a Health and Safety Program in the Laboratory of the Technology.

Chapter 3

OUTCOMES OF SCHOOL HEALTH AND SAFETY EDUCATION

Outcomes - Based Education Process.

Program Goals and Outcomes.

Indicators of Student Achievement of Program Outcomes.

Organizing Outcomes for Instruction.

Outcomes-Based Education Process

As described in Chapter 2, curriculum development is a process. The following model summarizes a process for developing an outcomes-based health and safety curriculum:

Part 1 - Exit Outcomes

1) Exit Outcomes - General statements that describe the knowledge, skills, processes and values that a student can expect from active participation upon graduation from the College. A student's awareness and development of lifestyle health and safety would be an example of an exit outcome.

2) Program Goals and Outcomes - General statements that describe the knowledge, skills, practices, and values that a student can expect from active participation in the program of study in the technology.

Part 2 - On Going Assessment in the Technology

A) Course/Unit Outcomes - Measurable statements which define the scope of a course through a series of instructional units.

B) Lesson Outcomes - Measurable statements which define the purpose of a specific lesson. Lesson outcomes reflect the process by which the course/unit outcomes will be achieved. Lesson outcomes will be developed by the instructor of the course/unit.

Program Goals and Outcomes

Sample program outcomes are written for four goal areas: knowledge, skills, values (attitudes) and practices (behaviors) which address the cognitive, affective and behavioral domains of learning.

As a result of participating in an integrated curriculum, a learner:

1. Acquires a basic understanding of health and safety procedures.
2. Knows healthful and safe behaviors which can prevent the majority of occupational deaths, illnesses, injuries and loss of quality of life.
3. Identifies potential hazards in the workplace.
4. Demonstrates basic first aid procedures.
5. Identifies and selects appropriate health and safety resources.
6. Demonstrates responsibility in making healthy and safe choices in the workplace.
7. Copes with stress in the workplace.
8. Learns how to acquire new skills.
9. Accepts responsibility for personal health and safety.
10. Respects others in the workplace.
11. Engages in healthy and safe work practices.
12. Abstains from behavior which could lead to possible injuries and illnesses in the workplace.

Indicators of Student Achievement of Health and Safety Education Program Outcomes

A) As a result of participating in an integrated course of study in a Technology, a student will:

1) Name risk behaviors which cause the majority of preventable deaths, diseases, injuries, and loss of quality of life.

2) List health and safety practices which can prevent the majority of deaths, injuries, and loss of quality of life that result from exposures in the workplace.

3) Summarize behaviors which can prevent and control occupational illnesses.

4) Identify behaviors for maintenance of positive mental and emotional health; for example, reducing stress.

5) Name environmental and occupational health hazards.

6) Distinguish between chronic pain and injury.

7) State the role of stress fatigue in causing health problems.

8) Identify the issues of chemical dependency and its negative effects on healthy and safe work performance.

9) Demonstrate healthful personal hygiene practices.

10) Demonstrate basic first aid and CPR procedures.

11) State procedures for all emergencies, including but not limited to fires, bomb threats, natural disasters. Knows how to contact emergency medical personnel.

12) Describe basic preventative health care procedures,and demonstrate healthy and safe decision-making.

13) Identify various providers, public and private, of health and safety education.

14) Demonstrate healthy and safe decision-making.

15) Perform self-appraisal of own status and exhibit self discipline in working in a healthy and safe manner.

16) Engage in work practices which protect the health of the community and the environment.

17) Use electronic and media sources to seek new infor mation.

18) Critique information and use problem solving in learning new skills in working in a healthy and safe manner.

19) Demonstrate knowledge of personal learning style regarding health and safety.

B. Works and interacts in a healthy and safe manner with others. As a result of participating in a technology which integrates health and safety, the student will:

1) Seek help when needed.

2) Be courteous to others.

3) Accept human diversity.

4) Consider the effects of own actions on others.

5) Accept the decision of others not to engage in behaviors that could endanger themselves or others.

6) Participate in activities which show concern for the community, the environment, and society.

7) Evaluate and communicate personal strengths and weaknesses concerning occupational and health and safety.

C. Engage in Lifestyle Health and Safety.
The student will:

1) Use refusal skills in resisting peer pressure to use tobacco, alcohol, and other drugs in the workplace and elsewhere.

2) Critique media messages promoting the use of tobac co, alcohol, and other drugs.

3) Recognize and share with others feelings resulting from abstaining from the use of tobacco, alcohol, and other drugs.

4) Reinforce the decision of family members, peers and others not to use tobacco, alcohol and other drugs.

5) Follow safety rules at home.

6) Obey safety regulations at school, in the workplace, and in the community.

7) Use a seatbelt when driving or riding in a vehicle.

8) Decline to ride in a vehicle with someone who has been using alcohol or other drugs.

9) Prevent an individual from driving a vehicle while under the influence of alcohol or other drugs.

10) Wear a helmet when riding a bicycle, motorcycle, or all-terrain vehicles.

11) Obey traffic laws when operating a vehicle.

12) Seek nonviolent ways to resolve conflict.

For those students who elect to take direct instruction in Occupational Health and Safety the following will be outcomes of the course.
The student will:

1) Acquire a basic understanding of the relationship between occupational injury, illness and the human body.

   a) Use current terminology in identifying major organs of the body.

   b) State the harmful effects tobacco, alcohol, and other drugs can have on the respiratory, cardiovascular, and reproductive systems.

   c) State the harmful effects occupational chemical exposures have on the organs of the body.

   d) State the harmful effects repeated physical stress has on the body.

   e) Describe the effects of how excessive noise, heat and other occupational stressors impair the body.

2. Acquires the essential skills necessary to lead a healthy and safe worklife.

   a) Distinguish between healthy and unhealthy risk taking behavior.

   b) Select healthy and safe alternatives for dealing with a problem.

   c) Select appropriate sources of health and safety information to address needs.

   d) Consider consequences of unhealthy and unsafe risk behavior.

   e) Evaluate health and safety information for reliability.

   f) Use reliable health and safety information in making.

4. Value the importance of a healthy and safe workplace. Engage in safe working practices using skills acquired in direct instruction.

   a) Use the hierarchy of controls to reduce hazards in the workplace.

   b) Use appropriate personal protective equipment where necessary.

   c) Engage in no activities which could cause a hazard to others.

   d) Is thoroughly familiar with the safe operation of equipment before using it.

   e) Uses no equipment unless the instructor has successfully evaluated the student in the use of the equipment.

Organizing Outcomes for Instruction

Implementation of program and unit level outcomes can be a difficult task when instruction is delivered through both direct and integrated instruction. Additionally, because of the time dilemma in the technologies, it will be difficult to address all outcomes each year, especially if direct instruction can't be delivered.

Instructional activities can be selected for each unit based on relevant issues identified through needs assessment evaluation of the students, faculty, and related advisory groups. The activities selected should reflect the integration of cognitive, affective, and behavioral outcomes.

In the outcomes education process, program or unit outcomes may be written based on the units selected for each hub. Outcomes written by the faculty of the technology and an instructor from the Department of Occupational Healthy and Safety will describe the scope of the safety and health education content. Each instructor may then develop lesson plans based on the program or unit outcomes.

Chapter 4

IMPLEMENTATION OF THE HEALTH AND SAFETY EDUCATION CURRICULUM PLAN

Implementing the Curriculum Plan

Sample Criteria for Selecting Health and Safety Education

Evaluation

Staff Development.

Sample Needs Assessment Form for Staff Development.

Lesson Planning.

Sample Lesson Plan.

Developing an Interdisciplinary Health and Safety Unit of Instruction

Implementing the Curriculum Plan

A well-written curriculum plan provides "vision" for the outcomes of a quality health and safety education program. Without complete implementation of the plan, the "vision" becomes only a dream. Conversely, implementing health and safety education curriculum without a plan is action that "passes time". Complete implementation of the health and safety education curriculum plan is the vision and action which together can impact student health and safety behaviors.

For complete implementation of the curriculum plan to occur, there must be ownership. The faculty members who teach in the technology must be committed to health and safety, and integrate this concept into their fields. Lastly, the laboratories themselves should be models of a healthy and safe workplace.

An advisory committee should help with the process of establishing expected outcomes by the student in regards to health and safety.

Quality Instructional Materials: Every effort will be made to have quality instructional materials available for the needs of the various technologies. As a pilot program, the Automotive Technology Department will work with the Occupational Health and Safety Department to appropriate quality instructional materials.

Staff Development: Instructors responsible for delivering instructional need and on going assistance in acquiring additional knowledge, skills and resources for providing health and safety education related to their technologies. Staff development is particularly important for instructors not specifically trained in the health areas. An example for assessing the needs of staff is provided on page 37.

Meaningful and Relevant Lessons: The implementation process also requires instructors to develop lessons which will enable the learner to achieve outcomes identified in the curriculum plan. Strategies are identified and sample lesson plan guidelines are included in this chapter. Additionally, these guidelines suggest that integration of health and safety in the technological curriculum be reinforced by direct instruction. Suggestions for developing an interdisciplinary health and safety unit are provided.

Evaluation

The processes of program development and implementation should be evaluated so that decisions may be made about improving instruction. Suggestions for conducting a program evaluation are provided in chapter 5.

EXAMPLE CRITERIA FOR SELECTING HEALTH AND SAFETY EDUCATION CURRICULA

CRITERIA	YES	TO SOME DEGREE	NO/N.A.	COMMENTS
OUTCOMES				
1. Are learner-focused outcomes provided?				
2. Are the identified outcomes measurable?				
3. Do the outcomes relate to the program technology outcomes?				
4. Do identified outcomes reflect cognitive, affective,and behavioral learning?				
CONTENT OF MATERIALS				
1. Is the content developmentally appropriate?				

CRITERIA	YES	TO SOME DEGREE	NO/N.A.	COMMENTS
2. Does the content reflect a positive approach for acquiring knowledge, skill practices and values for healthy and safe work practices?				
3. Does the content reflect continuity and progression from one unit level to the next?				
4. Are materials flexible to allow the content to be taught through integrated instruction?				
5. Is the content free from gender, minority and socioeconomic biases?				
6. Is assessment of student learning included?				
7. Have the materials been documented for effectively impacting healthy and safe knowledge, skills, values, and practices?				

****Adapted from "Criteria for Comprehensive Health Education Curricula" by the Southwest Regional Laboratory.****

Staff Development

"Staff development is engaging instructors and other staff in a process which provides a wide variety of opportunities for growth in knowledge within the education profession". (Cohen, 1991)

Characteristics of successful staff development programs include (Regional Laboratory, 1987)

1. Collectivity and collaboration.
2. Experimentation and risk taking.
3. Incorporation of available knowledge bases.
4. Appropriate participant involvement in goal setting, implementation, evaluation, and decision making.
5. Time to work on staff development and assimilate new learning.
6. Leadership and sustained administrative support .
7. Appropriate incentives and rewards.
8. Designs built on principles of adult learning and the change process.
9. Integration of individual goals with the goals of the college.

A development program which exhibits the aforementioned characteristics may more easily address the needs of instructors and staff to effectively implement the health and safety curriculum plan. For example, providing on-going opportunities for instructors to meet, plan, and experiment with integrated health and safety instruction allows the program to remain current and relevant for the learner. Additionally, effective staff development programs which use available knowledge bases may more readily involve other health and safety professionals as resources for assisting instructors in health and safety knowledge and skills.

Due to the funding mechanics of this grant, every effort will be made to maximize staff development while minimizing costs.

Sample Needs Assessment for Staff Development

The following form is provided as an example for assessing the needs of instructors to deliver effective health and safety instruction in the curriculum:

Staff Development Needs Assessment Form

Please put a check in the area that you feel most accurately describes your assessment.

	I am capable in this area	I need help obtaining info.	skills	resources
1. Definition and philosophy of health and safety education				
2. Rationale for college health and safety education				
3. Regulations for health and safety education				
4. School policy about health and safety issue				
5. Identifying critical and emerging health and safety issues				
6. Elements of health and safety effective program				
7. The curriculum planning process				
a. program exit learner outcome				
b. writing program outcomes				
c. integrated and direct instruction				

	I am capable in this area	I need help obtaining info.	skills	resources
d. Allocating instructional time				
8. Implementation of the plan				
a. Selecting instructional materials				
b. Preparing lesson plans				
c. Effective teaching strategies				
9. Evaluation of:				
a. Student learning				
b. Instruction				
c. Program				
10. Reinforcing instruction outside the classroom				

Lesson Planning

How individuals learn

The "new type of health and safety education" promoted in these guidelines suggests that learner-focused approaches to instruction be used. Health and safety education research has conclusively shown that knowledge acquisition alone will not lead to healthy and safe behaviors. Effective lessons allow the learner to acquire and apply knowledge through active learning experiences. Instruction should also be provided using diverse strategies to ensure all learning style characteristics are addressed.

Research of various teaching strategies has found that learning is retained at various rates depending on the method of instruction (Cohen, 1991).

Strategy	Average Retention Rate
Lecture	5%
Reading	10%
Audio-visuals	20%
Demonstration	30%
Discussion group	50%
Practice by doing	75%
Teach others immediate use of learning	90%

Research has shown that there are two major differences in how individuals learn (McCarthy, 1988). People perceive reality differently and also process information and experiences differently.

Some individuals perceive reality concretely by relying heavily on senses and feelings. Others perceive reality abstractly by logically thinking through the experience. Individuals fall at many different places on a continuum in perceiving reality.

Perception alone does not equal learning. The learner must also process the experience or information. Some individuals process information better through active participation while others tend to process through reflective observation. As with perception, people tend to process information at different places on a continuum.

Learning styles have been characterized in the following four types.

Type 1 - Imaginative learners. Perceive concretely and process reflectively.

Type 2 _ Analytic learners. Perceive abstractly and process reflectively.

Type 3 - Common sense learners. Perceive abstractly and process actively.

Type 4 - Dynamic learners. Perceive concretely and process actively.

For a learner to internalize information, a cycle of learning occurs. The learner must process the experience by 1) identifying feelings and thoughts about the experience, 2) analyzing the experience for significance and meaning and 3) generalizing the experience for application. Instructors can address all learning styles by using diverse strategies in the cycle of learning.

The following is a list of example strategies which may be used to develop learner-focused instruction.

1. Whole Group Discussion

2. Teacher-directed peer education

3. Homework

4. Experiments

5. Cooperative Learning

6. Brainstorming

7. Debates

8. Field Trips

9. Skills Rehearsals

10. Use of Guest Speakers

11. Personal Health and Safety Appraisals

Structuring a Health and Safety Education Lesson Plan into a Program Lesson Plan.

Hunter (1989) has suggested that a lesson best be structured by determining:

1. What is to be learned.

2. What the learner will do to accomplish the desired learning.

3. What the instructor will do to facilitate the learning.

An outline for structuring a lesson and an example lesson plan follow. The plan demonstrates use of outcomes from Chapter four. This outline incorporates education in the discipline with safety and health integrated in the lesson plan.

1. What is to be learned?

   a) Identify the course outcome and unit outcome which the lesson will address.

   b) Identify the potential health and safety problems.

   c) Identify the intended outcome of the lesson. What will the student know, what skills will be developed, and what behavior will result from the lesson?

   d) Identify the health and safety behaviors to be developed.

   e) Identify prerequisite knowledge and skills necessary.

   f) Review of previous learning may be necessary prior to the new learning.

   g) Identify knowledge of safety and health that might need to be reviewed.

2. What will the student do to accomplish the desired outcome?

   a) Identify the activities in which students will participate to review previous learning and achieve the new learning.

   b) Identify how student achievement will be measured in relationship to health and safety.

   c) Identify how student achievement of the intended outcome will be determined. How will students demonstrate that new learning has been internalized?

   d) Identify how student achievement will be measured in relation to health and safety.

   e) Identify activities in which students will participate to master learning or to enrich the learning experience.

   f) Identify healthy and safe methods to perform these activities.

3. What will the instructor do to facilitate the learning?

   a) Identify the strategies for facilitating the learning activity. How will the instructor facilitate the internalization of the learning experience?

   b) Identify the process for assessing student achievement of learning. What form (s) of assessment will be used?

c) Identify how the instructor will assess that safety and health is being implemented in the learning process. How will the assessment be performed?

d) Identify how the facilitation process will be assessed. How will the instructor assess his/her own performance?

e) Identify the measurement to be used to determine if the instructor has provided the necessary health and safety instruction for the lesson.

Sample Lesson Plan

A sample lesson plan will be provided by a technology, and is provided in Section 2 of this project.

Developing an Interdisciplinary Health and Safety Unit of Instruction

Developing on Interdisciplinary Health and Safety Unit.

One of the goals of the Center for Occupational Health and Safety is to develop a multidisciplinary curriculum to integrate health and safety. Although this goal is beyond the limits of the grant, some consideration should be given for future development.

These guidelines have provided suggestions for health and safety education to be taught through a combination of direct and integrated instruction. Direct instruction would be a 3 credit course in Occupational Health and Safety. Integrated instruction would be integrating health and safety throughout a program of instruction.

Chapter 5

EVALUATION

Program Evaluation

Formative (Process) Evaluation

Sample Objectives for Formative Evaluation

Selecting Appropriate Measures

Sample Measures
- **Process Objectives**
- **Instructor Perceptions**

Program Evaluation

Evaluation is a decision-making process in which data is gathered and used to make judgments about a program. Formative (process) evaluation is used to make decisions on how to improve a program while summative (impact) evaluation provides information for use in deciding whether to continue a program.

The terms evaluation and assessment are used interchangeable. Assessment is a process of gathering data or measuring and assembling them in some understandable form. The data or measures may then be used to conduct a formal evaluation or may simply be used informally to make minor adjustments in the program. For example, instructors continuously assess the progress of students in achieving desired learning outcomes and then use the information immediately to make decisions about instruction. More formal evaluation of student achievement of learning outcomes require careful planning which should be done during the program development and implementation stages.

Evaluating the overall health and safety program may be viewed as a complex task because the desired outcome is for students to acquire health and safety knowledge, skills, values and practices. Additionally, because behavior may be influenced by environmental factors such as family, peers, supervisors, faculty, evaluating the effectiveness of the school health and safety program may seem risky. However, as stated in Chapter 1, considerable evidence does exist that school health and safety education can impact students health and safety knowledge, attitudes, and practices when the program is well designed and completely implemented. therefore, schools designing and implementing programs with elements of effective programs in mind will want to evaluate the process.

In planning program evaluation, a decision must first be made about which type of evaluation to use. To determine which type to use, the following must be considered:

1. Who is the intended audience for the evaluation information?

   a) For program developers - use formative

   b) For decision makers or funders - use summative

2. What is the purpose of evaluating the program?

   a) For program improvement - use formative

   b) For program continuation - use summative

Because an overall health and safety education involves on-going instruction from the faculty and guidance from student services, these guidelines offer suggestions for conducting formative or process evaluation. Based on the results of process evaluation, decisions may be made about how to improve components of the program, such as staff development, instructional materials, and instructional strategies.

Summative evaluation requires the use of a professional evaluator and is beyond the scope of this project.

Formative (Process) Evaluation

Planning to conduct formative evaluation first requires that specific objectives be identified. Two types of evaluation objectives should be included in the plan:

1. Process objectives state how developers want the program to function (i.e. the means) and answer the question; "How do we go about accomplishing outcomes?".

2. Outcomes objectives state what developers want as a result of the program (i.e. the ends) and answer the question, "What are we trying to accomplish?".

A process objective deals with the intended procedures that are to be implemented in a program. This evaluation addresses specifically what occurs in the design and delivery of the program. Elements of effective health and safety education programs have been identified and may serve as a foundation on which programs may be developed and implemented. Thus, process objectives may be written using the identified elements of effective programs described in chapter I.

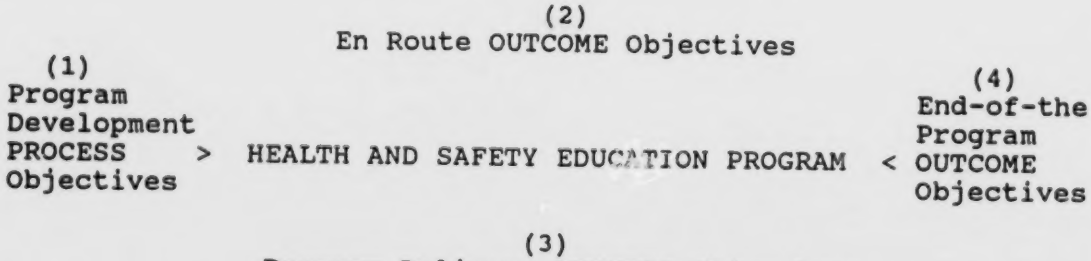
Outcome objectives describe the intended changes that are sought in students as a consequence of having participated in the program. In the school health and safety program, outcome objectives typically address the knowledge, skills, values, and practices students demonstrate as a result of participation in the program.

Outcomes objectives describe either end-of-the-program results or en route changes. En route objectives describe student accomplishment of outcomes which serve as "building blocks" toward the ultimate accomplishment of end-of-the-program objectives. Program outcomes provided on page 9 describe both en route and end-of-the-program objectives. En route outcome objectives are characterized by the goal areas "Knows how to be Healthy and Safe" , "Acquire the essential skills necessary to lead a healthy life", and "Values the importance of a healthy lifestyle".

Sample outcomes in the goal area of "demonstrates healthy and safe lifestyle practices" exemplify end-of-the-program outcome objectives. Sample indicators of student achievement of program outcomes listed on pages 10 through 12 of section 1 may also be used in writing outcome objectives for evaluation purposes.

More specifically, a health and safety program integrated into a technology's course of study could be evaluated by conducting assessments and the completion of specified units of study.

The following model identifies the four types of objectives used to focus the formative evaluation.



Sample Objectives for Formative Evaluation

Following are samples process and outcome objectives for formative evaluation of an integrated program. Sample en route and end-of-the-program objectives are referenced to sample indicators of student achievement of program outcomes provided in Chapter 3.

Program	Program Development Process Objective	Program Implementation Process Objective	Program Results Outcome Objectives
Student	Needs of students will be identified through the use of audits, and student needs assessment.	Needs will be incorporated in the program planning process.	
Community	Advisory groups and trade associations will be involved in decisions regarding integration of safety and health across the curriculum.	Meeting will be held with advisory groups; surveys will be sent to Trade Associations.	
OHS Faculty and Individual Program	An outcomes-based curriculum plan will be written by the program facilitator with assistance from a faculty member of the Occupational Health and Safety Department.	Instructors and staff will be provided training to implement the plan.	

Program	Program Development Process Objective	Program Implementation Process Objective	Program Results Outcome Objectives
School	A schedule for allocation of direct and integrated health and safety instructional time will be planned in each program.	Instructors will deliver integrated health and safety instruction as necessary.	
Instructor	Instructors will plan lessons to outcomes identified in the curriculum plan.	Instructors will facilitate lessons using multiple strategies and addressing all learning styles.	

En Route Outcome Objectives——————>End of the program outcome objectives

Program	Program Development Process Objective	Program Implementation Process Objective	Program Results Outcome Objectives
Evaluation			
Knowledge	On a cognitive assessment instrument students will correctly identify health and safety risk behaviors which cause the majority of preventable deaths, injuries, and property destruction.		
Skills	Students will demonstrate the ability to resist negative peer pressure, knowing horseplay in the work environment can lead to disaster.		Based on anonymously supplied self reports students will use refusal skills in resisting peer pressure to engage in horseplay and other disruptive behavior in the laboratory.
Values	On an effective assessment instrument students will identify personal risks when working with the equipment of their trade.		Based on anonymously supplied self reports students will abstain from unhealthy and unsafe behavior in the laboratory.

Selecting Appropriate Measures

Evaluating school health and safety programs may best be accomplished by using criterion-referenced measures. Criterion-referenced assessment offers absolute measurement of what the examination can or cannot do. Thus, criterion-referenced measures provide the best information for making decisions about the quality of a program.

Measuring process objectives for program development and implementation may be accomplished through the use of a checklist assessment form. An example is provided on a subsequent page.

It may also be important to assess instructor's perceived self-knowledge, skills, and attitudes about teaching safety and health education as a process measure for program improvement. Examples are provided.

Various evaluative methods provide:

	Knowledge	Values/Attitudes	Practices/Behaviors
Tests	X		
Self-Report		X	X
Interviews		X	
Observations	X	X	X

Assessment instruments selected for collecting information to measure outcome objectives must be reliable (consistent in what it measures), valid (yields scores from which valid inferences can be drawn), and free from biases.

When to Administer Measures

Deciding when to administer measures depends on the data-gathering design selected. There are four possible times in which information may be selected from students regarding health and safety education.

(1) Pretest	(2) En route Test	(3) Immediate Post tests	(4) Delayed Post tests

Pretests may be used to identify students needs so that instruction may be designed accordingly. When compared with post measures, pretest data can be used to measure outcomes objectives. For health and safety, a hazard evaluation of the potential health and safety problems would be a tool for pretesting.

En route tests can provide measures of en route objectives. The information obtained from en route measures can be used to make immediate program improvements. For health and safety integration, in process safety evaluation would be an en route test. Immediate post tests provide measures of outcomes objectives.

Delayed post tests administered several months after a program conclusion provides important information about the long term effects of students health and safety knowledge, attitudes, and behavior. This could be done between the first and second semesters of study, or at the beginning of the second year.

Care should be taken not to administer an excessive number of different measures. It is also important to avoid an excessive number of administrations of a measure. Determining when to administer should also take into consideration factors such as efficient use of resources (financial and human) to collect, analyze, and make program decision about the data collected. The curriculums of the technologies are highly intensive, and safety and health education should not become burdensome on the curriculum because of excessive examination. 30

Sample Measures

Process Objectives

The following checklist is an example instrument for collecting information to assess process objectives. This should be used as a guide to measure the success of the integrated plan.

Checklist for sample process objectives

Complete the assessment using the following key:

A. Completed entirely

B. Completed, but improvement is needed

C. Currently being completed or is being considered for completion

D. Not completed and not being considered for completion

Program Development

____ 1. Needs of students will be identified through the use of audits, and students assessments.

____ 2. Advisory groups and trade associations will be involved in decisions regarding integration of safety and health across the curriculum.

____ 3. An outcomes-based curriculum plan will be written by the program faculty with assistance from a faculty member of the Occupational Health and Safety Department.

____ 4. A schedule for allocation of direct and integrated health and safety instructional time will be planned in each program.

____ 5. Instructors will plan lessons to address outcomes identified in the curriculum plan.

____ 6. College policy and mission statement will be reviewed to determine degree of support for health and safety instruction.

____ 7. A health and safety committee will be formed by each technology.

Program Implementation

____ 1. Needs will be incorporated in the program planning process.

____ 2. Meetings will be held with advisory groups; surveys will be sent to Trade Association.

____ 3. Instructors and staff will be provided training to implement the plan.

____ 4. Instructors will deliver health and safety instruction, as necessary.

____ 5. Instructors will facilitate lessons using multiple strategies and addressing all learning styles.

____ 6. Policy and mission rewritten to incorporate health and safety.

____ 7. A review of the department committee will be conducted by the school health and safety committee.

Instructor Perceptions

Sample questions are provided to measure the instructor's perceptions about personal knowledge, attitudes, skills, and comfort in teaching health and safety education.

Information obtained from questions such as those below can be helpful in measuring the perceptions of instructors assigned to integrate health and safety across the curriculum. When collecting the information, confidentiality and anonymity should be maintained. The results could be appropriately used to design staff development opportunities.

Note: These questions are examples only. This is not intended to be used as an assessment instrument.

Sample Questionnaire

Complete the responses using the key below. Do not write your name on this form.

SA= Strongly Agree
A= Agree
U= Uncertain
D= Disagree
SD= Strongly Disagree

1. I am fairly knowledgeable about health and safety in the workplace.

(circle one) SA A U D SD

2. I am confident that I can deliver occupational health in struction that meets the needs of my students and my technology

(circle one) SA A U D SD

3. Students I teach are at risk to chemical exposures in the laboratory of the technology.

(circle one) SA A U D SD

4. Instructors should not have to deal with the emotional needs of students.

(circle one) SA A U D SD

5. Health and Safety education should not address personal risk behaviors.

(circle one) SA A U D SD

6. Health and safety education will make a difference in the behavior of students.

(circle one) SA A U D SD

7. People with AIDS should not be allowed to work if they come in contact with other people.

(circle one) SA A U D SD

8. Health and safety education should focus on teaching students how to avoid risky <u>behaviors</u>, as opposed to analyzing unhealthy and unsafe <u>conditions</u>.

(circle one) SA A U D SD

9. Health and safety education should teach students decision - making skills.

(circle one) SA A U D SD

Chapter 6

A COMPREHENSIVE HEALTH AND SAFETY PROGRAM

Healthy and Safe Lifestyles: A multilevel approach for Developing a Comprehensive Health and Safety Plan.

Healthy Lifestyle Model

Healthy and Safe Laboratory Mode.

Potential Services Coordinated by a School Health and Safety Committee

Healthy and Safe Lifestyles: A multi-level approach for Developing a Comprehensive Health and Safety Plan.

As students are educated to meet the demands of the 21st century, each must be equipped with the knowledge, skills, and values necessary to be a healthy and safe person. Because of the complexity and intermingling of skills between the workplace and the external environment, collaboration within the college and externally with the community will produce a more comprehensive approach for program planning and implementation. As stated in the philosophy earlier in this document, a comprehensive college safety and health program developed in collaboration with the community may more effectively address the needs of students through the efficient use of available financial and human resources.

The following healthy and safe lifestyles conceptual model suggests a comprehensive approach for the school to address the healthy and safe well-being of its students as follows.

1. An Advisory Council, comprised of faculty, staff, and employers and their representatives, provide leadership and support for the establishment of an ongoing comprehensive plan for the technology.

2. A healthy and safe school environment and climate contributes to the physical and mental comfort, social development and health and safety of students and school personnel. School policy must support the healthful and safe environment, such as that which requires safety glasses to be worn in all laboratories at all times.

3. Quality health services, supported by community health services, provides important screening, early intervention, referral, and remediation for health problems of students and staff. The school nurse also provides important leadership in coordinating school health promotion activities.

4. School Food Service Programs provides nutritionally balanced meals to support school health education and allow students and staff to make healthful dietary choices.

5. An integrated program of health and safety education com prised of faculty from the technologies and the Occupation al Health and Safety Department Faculty.

6. School Counselors and psychologists to work under the auspices of the Dean of Students. These services provide valuable aids for students and staff by addressing healthy human growth and development. The members of this staff may be called upon to provide intervention strategies for students that address psychological factors such as low self esteem, and alcohol and drug problems. Typically, these professionals are trained to help students with development of life skills such as problem solving, decision making, stress management, and conflict resolution.

7. A school wellness program provides the opportunity for faculty and staff to promote healthy and safe behaviors which contribute to their physical, mental, and social wellbeing thereby enhancing their effectiveness in working with students. Considerable evidence exists supporting the cost effectiveness of employee wellness programs.

Potential Services Coordinated by a School Health and Safety Committee

A school health and safety team comprised of individuals responsible for the components of a comprehensive school health and safety program can collaboratively provide services to address the physical, emotional, and social well being of students and staff. Following are examples of services for components which might be used to support health and safety instruction.

1. The school can:

(a) Encourage the adoption of policy that establishes:

1) a tobacco-free environment

2) healthy and safe workplaces

3) healthy and safe laboratories

(b) Encourage building staff to strive for a climate which reflects:

1) An atmosphere of caring and concern for students and colleagues

2) Openness for new and innovative ways of doing business

3) Daily modeling of healthy and safe behaviors by staff and students

2. School Health Services:

(a) Coordinated with community health services.

(b) Conduct health screenings for students and staff to assess:

1) vision, hearing, and oral health

2) blood pressure

3) cholesterol

(c) Assisting Student Services with primary prevention programming for:

1) identifying critical and emergency health issues

2) assessing health-related fitness levels of students and staff

3) stress management

4) overweight/obese students and staff

5) pregnancy/prenatal care

6) alcohol/drug awareness

3. School Food Service Coordinated by the school food service director to provide:

(a) Meals following USDA/DHHS Guidelines

(b) Meals which allow low fat choices for overweight/obese students and staff

(c) solicit student input for menu planning

4. Lifetime Fitness and Activity Coordinated by Student Services

(a) Develop an intramural activities program for students and staff

(b) Develop a physical fitness training program for students and staff

5. School Counseling and Psychological Services Coordinated by Dean of Student Services, and psychologists to:

   Provide screening and referral services for students and staff experiencing difficulties with such problems as:

   (a) alcohol and other drugs

   (b) emotional well-being

   (c) educational success

   (d) career counseling

   (e) child care

   (f) peer pressure to engage in health risk behaviors

6. Faculty and Staff Wellness will be Coordinated by the School Nurse and Health and Safety Committee

   Establish health promotion activities for faculty and staff to address:

   (1) high blood pressure management

   (2) smoking cessation

   (3) stress management

   (4) physical fitness and activity

7. Community Involvement will be Coordinated by faculty of Occupational Health and Safety to organize school and industry health and safety promotion activities such as:

   (1) health and safety seminars, conferences

   (2) specific industrial health and safety training

   (3) coordinating with universities and colleges to provide quality health and safety update/upgrade training